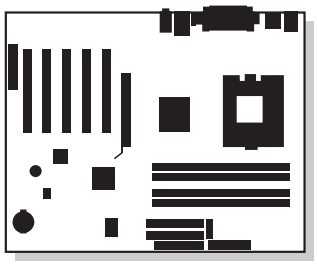
Intel® Desktop Board D850GB/D850GBAL Product Guide



Order Number: A30314-002

Revision History

Revision	Revision History	Date
-001	First release.	September 2000
-002	Second release.	October 2000

If an FCC declaration of conformity marking is present on the board, the following statement applies:

FCC Declaration of Conformity

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions related to the EMC performance of this product, contact:

Intel Corporation
5200 N.E. Elam Young Parkway
Hillsboro, OR 97124
1-800-628-8686

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit other than the one to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Canadian Department of Communications Compliance Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numerique német pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe B prescrites dans le Réglement sur le broullage radioélectrique édicté par le ministére des Communications du Canada.

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1 Desktop Board Features

Feature Summary

Form Factor	ATX compatible (9.6 inches x 12 inches)
Processor	• Support for an Intel® Pentium® 4 processor in a 423-Pin Grid Array (PGA) package • 400 MHz system data bus
Memory	• Four 168-pin Direct Rambus† RIMM† sockets • Support from 128 MB to a maximum 2 GB of system memory
Chipset	Intel® 850 chipset, consisting of: • Intel® 82850 Memory Controller Hub (MCH) with Accelerated Hub Architecture (AHA) bus • Intel® 82801BA I/O Controller Hub (ICH2) with AHA bus • Firmware Hub (FWH)
I/O Control	SMSC LPC47M102 low pin count (LPC) interface I/O controller
LAN (D850GBAL only)	• Intel® 82562EM 10/100 Mbit/sec Platform LAN Connect (PLC) device • RJ-45 connector
Video	AGP connector supporting 1.5 V 4X or 2X AGP cards
Audio (D850GBAL only)	Analog Devices AD1881 analog codec (AC '97)
Peripheral Interfaces	• Two Universal Serial Bus (USB) ports and a header on the board for an additional two ports • Two IDE interfaces with Ultra DMA, ATA-66/100 support • One diskette drive interface • One parallel port • One serial port • PS/2† keyboard and mouse ports
Expansion Capabilities	• Five PCI bus add-in card connectors • One AGP connector
CNR (D850GB only)	One Communication and Networking Riser (CNR) shared with PCI slot 5
BIOS	• Intel/AMI BIOS • 4 Mbit symmetrical flash memory • Support for SMBIOS
Power Management	• Support for Advanced Configuration and Power Interface (ACPI) • Support for Advanced Power Management (APM) • Support for Plug and Play

continued

Feature Summary (continued)

Management Features	Hardware monitor with • Two fan sensing inputs used to monitor fan activity • Remote diode temperature sensing • Voltage sensing to detect out of range values
Instantly Available PC	• Support for *PCI Local Bus Specification Revision 2.2* • Suspend to RAM (STR) support • Wake on USB, PCI, CNR, RS-232, PS/2, LAN, and front panel
Wake on LAN† Technology Connector	Support for system wake up using an add-in network interface card with remote wake up capability
Other Features	• Enhanced diagnostics LEDs on the back panel • SCSI hard drive activity LED connector for the front panel • Speaker

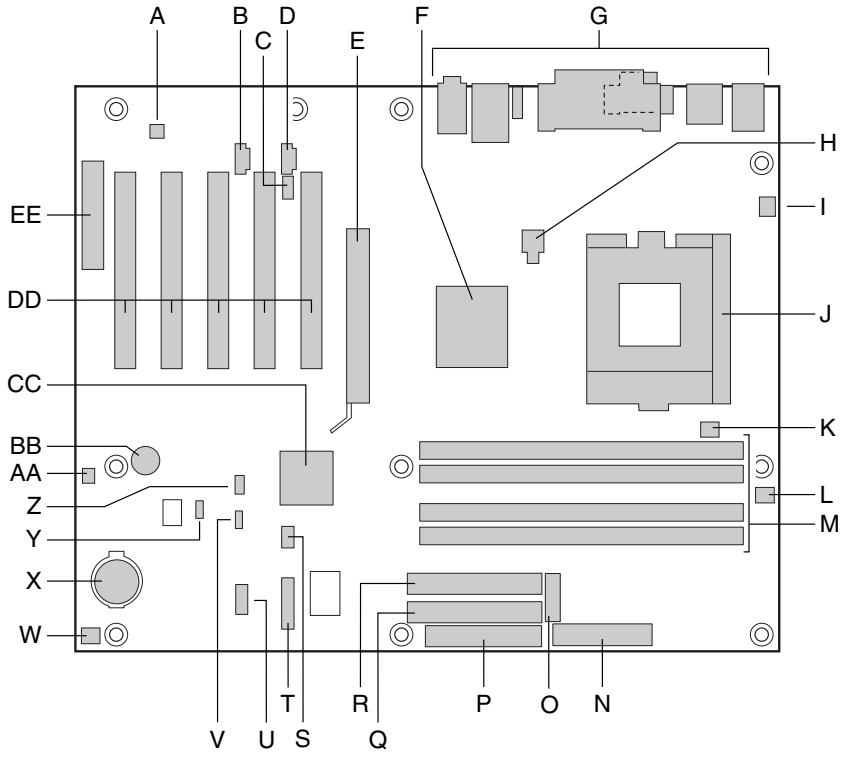
NOTE

For information about Intel® desktop boards, including technical product specifications, BIOS updates, and device drivers, go to the Intel World Wide Web site at:

http://support.intel.com/support/motherboards/desktop/

Components

Figure 1 shows the major components on the board.



A.	ADI AD1881 audio codec (D850GBAL only)	Q.	Primary IDE connector
B.	Auxiliary line-in connector (D850GBAL only)	R.	Secondary IDE connector
C.	Legacy CD-ROM connector (D850GBAL only)	S.	USB port 2 connector
D.	ATAPI-style CD-ROM connector (D850GBAL only)	T.	Front panel connector
E.	AGP connector	U.	Front panel USB connector
F.	Intel 82850 Memory Controller Hub (MCH)	V.	Alternate power LED/sleep connector
G.	Back panel connectors	W.	Chassis fan connector
H.	12 V processor core voltage connector	X.	Battery
I.	Chassis fan connector	Y.	BIOS configuration jumper
J.	Processor socket	Z.	Wake on LAN technology connector
K.	Processor fan connector	AA.	SCSI LED connector
L.	RIMM fan connector	BB.	Speaker
M.	RIMM sockets	CC.	Intel 82801BA I/O Controller Hub (ICH2)
N.	Power connector	DD.	PCI bus add-in card connectors
O.	Auxiliary power connector	EE.	Communication and Networking Riser (CNR) (D850GB only)
P.	Diskette drive connector		

Figure 1. Desktop Board Components

Processor

CAUTION

The D850GB/D850GBAL board supports processors that have a 49.8 A maximum current draw (1.1 to 1.85 V core). Using a processor not in compliance with these guidelines can damage the processor, the board, and the power supply. See the processor's data sheet for current usage requirements.

NOTE

66 MHz system bus frequency processors are not supported in this product. A hardware lockout is provided so that if such a processor is installed, the D850GB/D850GBAL board will not power-up.

The board supports a single Intel Pentium 4 processor. Processors are not included with the board and must be purchased separately.

The processor connects to the board through the 423 PGA socket. The Pentium 4 processor may be removed and replaced to accommodate supported higher speed processors.

The board supports the processors listed in Table 1.

Table 1. Processors Supported by the Desktop Board

Processor Type	Processor Frequency (GHz)	System Bus Frequency (MHz)	L2 Cache Size (kB)
Intel Pentium 4 processor	1.3, 1.4, and 1.5	400	256

For the latest information on processor support for the D850GB/D850GBAL board, refer to the Intel desktop board web site at:

http://support.intel.com/support/motherboards/desktop/

For instructions on installing or upgrading the processor, see Chapter 2.

Main Memory

The board has four 2.5 V memory module sockets that support RIMMs containing Direct Rambus DRAM (RDRAM) devices.

The board supports the following memory features:

- Maximum of 32 DRAM devices per channel
- 128 MB (minimum) to 2 GB (maximum) onboard capacity utilizing 256 Mbit or 512 Mbit technology
- Single- or double-sided RIMM modules
- PC600 or PC800 compliant RDRAM
- Serial Presence Detect (SPD) memory only

NOTE

For information about vendors that support these memory requirements, refer to the D850GB link on this Intel web site:

http://support.intel.com/support/motherboards/desktop/

For information about installing memory, see Chapter 2.

Intel® 850 Chipset

The Intel 850 chipset consists of the following devices:

- Intel 82850 Memory Controller Hub (MCH) with AHA bus
- Intel 82801BA I/O Controller Hub (ICH2) with AHA bus
- Firmware Hub (FWH)

Intel® 82850 Memory Controller Hub (MCH)

The MCH has these features:

- Integrated dual Direct Rambus technology memory channel
- Support for 128 MB to 2 GB main system memory
- Auto-detection of RDRAM memory
- Support for a single AGP device

Intel® 82801BA I/O Controller Hub (ICH2)

The ICH2 has these features:

- Integrated Intel® Ethernet LAN MAC (external PLC required)
- Support for the PCI interface
- Support for the Low Pin Count (LPC) interface
- Integrated IDE controller
- Support for USB
- Support for CNR
- General purpose I/O
- Power management logic
- Support for the System Management Bus
- Real-Time Clock
- Support for AC ’97 audio devices and modems

Firmware Hub (FWH)

The FWH has these features:

- System BIOS
- System security and manageability logic that enables protection for storing and updating of platform information

Input/Output (I/O) Controller

The SMSC LPC47M102 ultra I/O controller features the following:

- Low pin count (LPC) interface
- 3.3 V operation
- One serial port
- One parallel port with Extended Capabilities Port (ECP) and Enhanced Parallel Port (EPP) support
- Serial IRQ interface compatible with serialized IRQ support for PCI systems
- PS/2-style mouse and keyboard interfaces
- Interface for one 1.2 MB, 1.44 MB, or 2.88 MB diskette drive
- Intelligent power management, including a programmable wake up event interface
- PCI power management support
- IrDA† 1.0 compliant
- Fan control:
  - — Two fan control outputs
  - — Two fan tachometer inputs

Real-Time Clock

The Real-Time Clock (RTC) is integrated into the chipset. The RTC provides battery backed-up date and time keeping device with two banks of static RAM with 128 bytes each. A battery on the board keeps the clock current when the computer is turned off.

NOTE

The recommended method of accessing the date in systems with Intel desktop boards is indirectly from the Real-Time Clock (RTC) via the BIOS. The BIOS on Intel desktop boards contains a century checking and maintenance feature that checks the least two significant digits of the year stored in the RTC during each BIOS request (INT 1Ah) to read the date and, if less than 80 (i.e., 1980 is the first year supported by the PC), updates the century byte to 20. This feature enables operating systems and applications using the BIOS date/time services to reliably manipulate the year as a four-digit value.

USB Support

The board has two USB ports. Two additional ports may be connected to a header on the board. You can connect two USB peripheral devices directly to the computer without an external hub. To attach more than two devices, connect an external hub to either of the built-in ports. The board supports the standard universal host controller interface (UHCI) and takes advantage of standard software drivers written to be compatible with UHCI.

NOTE

Computer systems that have an unshielded cable attached to a USB port might not meet FCC Class B requirements, even if no device or a low-speed USB device is attached to the cable. Use a shielded cable that meets the requirements for a full-speed USB device.

PCI Enhanced IDE Interface

The ICH2's IDE interface handles the exchange of information between the processor and peripheral devices like hard disks, CD-ROM drives, and Iomega Zip† drives inside the computer. The interface supports:

- Up to four IDE devices (such as hard drives)
- ATAPI devices (such as CD-ROM drives)
- PIO Mode 3 and PIO Mode 4 devices
- Ultra ATA-66/100 protocols
- Support for laser servo (LS-120) drives

Expansion Slots

The board has:

- Five PCI bus add-in card connectors
- One AGP connector
- One CNR connector shared with PCI slot 5 (D850GB only)

Accelerated Graphics Port (AGP)

NOTE

The board is only compatible with 1.5 V AGP cards.

The AGP is a high-performance bus for graphics-intensive applications, such as 3D graphics. AGP is independent of the PCI bus and is intended for exclusive use with graphical display devices.

The AGP connector supports AGP 4X and 2X add-in cards. The AGP card retention mechanism is used only with cards with retention notches (see Figure 3 on page 22). For information about installing the AGP card retention mechanism and an AGP card, see Chapter 2.

Communication and Networking Riser (CNR) (D850GB only)

The CNR provides an interface that supports the audio, modem, USB, and LAN interfaces of the Intel 850 chipset.

Audio Subsystem (D850GBAL only)

The audio subsystem features the following:

- Intel 82801BA ICH2
- Analog Devices AD1881 analog codec (AC '97)

NOTE

The line out connector, located on the back panel, is designed to power either headphones or amplified speakers only. Poor audio quality may occur if passive (non-amplified) speakers are connected to this output.

Audio drivers and utilities are available from Intel's World Wide Web site:

http://support.intel.com/support/motherboards/desktop/

BIOS

The BIOS provides the Power-On Self-Test (POST), the BIOS Setup program, the PCI and IDE auto-configuration utilities, and the video BIOS. The BIOS is stored in the Firmware Hub.

The BIOS can be updated by following the instructions in Section 3.

PCI Auto Configuration

If you install a PCI add-in board in your computer, the PCI auto-configuration utility in the BIOS automatically detects and configures the resources (IRQs, DMA channels, and I/O space) for that add-in board. You do not need to run the BIOS Setup program after you install a PCI add-in board.

IDE Auto Configuration

If you install an IDE device (such as a hard drive) in your computer, the IDE auto-configuration utility in the BIOS automatically detects and configures the device for your computer. You do not need to run the BIOS Setup program after installing an IDE device.

Security Passwords

The BIOS includes security features that restrict whether the BIOS Setup program can be accessed and who can boot the computer. A supervisor password and a user password can be set for the Setup and for booting the computer, with the following restrictions:

- The supervisor password gives unrestricted access to view and change all Setup options. If only the supervisor password is set, pressing <Enter> at the password prompt of Setup gives the user restricted access to Setup.
- If both the supervisor and user passwords are set, you must enter either the supervisor password or the user password to access Setup. Setup options are then available for viewing and changing depending on whether the supervisor or user password was entered.
- Setting a user password restricts who can boot the computer. The password prompt is displayed before the computer is booted. If only the supervisor password is set, the computer boots without asking for a password. If both passwords are set, you can enter either password to boot the computer.

LAN Subsystem (D850GBAL only)

The Network Interface Controller subsystem consists of the ICH2 (with integrated LAN Media Access Controller) and a physical layer interface device. Features include:

- PCI Bus Master interface
- CSMA/CD Protocol Engine
- Serial CSMA/CD unit interface that supports the following physical layer interface devices:
  - 82562EM onboard LAN
  - 82562ET/EM (10/100 Mbit/sec Ethernet) on CNR bus (D850GB only)
  - 82562EH (1 Mbit/sec HomePNA†)on CNR bus (D850GB only)
- PCI Power Management
  - Support APM
  - Supports ACPI technology
  - Supports Wake up from suspend state (Wake on LAN technology)

LAN Subsystem Software

For LAN software and drivers, refer to the D850GB link on Intel's World Wide Web site at:

http://support.intel.com/support/motherboards/desktop

RJ-45 LAN Connector LEDs

Two LEDs are built into the RJ-45 LAN connector. Table 2 describes the LED states when the board is powered up and the LAN subsystem is operating.

Table 2. RJ-45 LAN Connector LEDs

LED Color	LED State	Indicates
Green	Off	10 Mbit/sec data rate is selected.
	On	100 Mbit/sec data rate is selected.
Yellow	Off	LAN link is not established.
	On (steady state)	LAN link is established.
	On (brighter and pulsing)	The computer is communicating with another computer on the LAN.

Enhanced Diagnostic LEDs

Four dual-colored enhanced diagnostic LEDs are located on the back panel. The LEDs report POST failures. See page 80 for information about the LEDs.

Speaker

A 47 Ω inductive speaker is mounted on the desktop board. The speaker provides audible error code (beep code) information during the Power-On Self-Test (POST).

Battery

A battery on the board keeps the values in CMOS RAM and the clock current when the computer is turned off. See Chapter 2 for instructions on how to replace the battery.

Power Management Features

Power management is implemented at several levels, including:

- Software support:
  - Advanced Configuration and Power Interface (ACPI)
  - Advanced Power Management (APM)
- Hardware support:
  - Power connector
  - Fan connectors
  - Wake on LAN technology
  - Instantly Available technology
  - Resume on Ring
  - Wake from USB
  - Wake from PS/2 keyboard
  - PME# wakeup support

If the board is used with an ACPI-aware operating system, the BIOS can provide ACPI support. Otherwise, it defaults to APM support.

Wake on LAN Technology

⚠ CAUTION

For Wake on LAN technology, the 5-V standby line for the power supply must be capable of delivering +5 V ± 5 % at 720 mA. Failure to provide adequate standby current when using this feature can damage the power supply.

The Wake on LAN technology connector can be used with PCI bus network adapters that have a remote wake-up connector. Network adapters that are PCI 2.2 compliant assert the wake-up signal using the PCI bus signal PME# (pin A19 on the PCI bus connectors). See Figure 1 on page 9 for the location of the Wake on LAN technology connector on the board.

Instantly Available Technology

⚠ CAUTION

For Wake on LAN technology, the 5-V standby line for the power supply must be capable of delivering +5 V ± 5 % at 720 mA. Failure to provide adequate standby current when using this feature can damage the power supply.

Instantly Available technology enables the board to enter the ACPI S3 (Suspend-to-RAM) sleep state. While in the S3 sleep state, the computer will appear to be off. When signaled by a wake-up device or event, the system quickly returns to its last known awake state.

The board's standby power indicator, shown in Figure 2 on page 19, is lit when the memory modules and PCI bus connectors have power, even when the computer appears to be off.

If the system has a dual-colored power LED on the front panel, the sleep state is indicated by the LED turning amber.

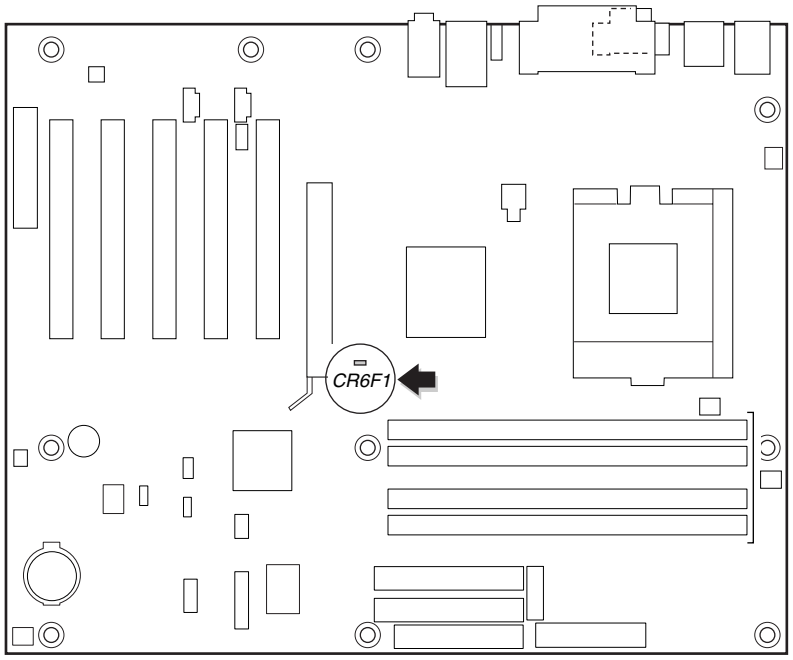


Figure 2. Location of Standby Power Indicator

⚠ CAUTION

If the standby current necessary to support multiple wake events from the PCI and/or USB buses exceeds power supply capacity, the board may lose register settings stored in memory. Calculate the standby current requirements using the steps described below.

Power supplies used with this board must be able to provide enough standby current to support the standard Instantly Available (ACPI S3 sleep state) configuration as outlined in Table 3. Values are determined by specifications such as PCI 2.2. Actual measurements may vary.

To estimate the total amount of standby current required for a particular system configuration, standby current requirements of all installed components must be added. Refer to the descriptions in Table 3 and follow the steps outlined below:

1. Note the total D850GB/D850GBAL board standby current requirement.
2. Add to that the total PS/2 port standby current requirement if a wake-enabled device is connected.
3. Add, from the PCI 2.2 slots (wake-enabled) row, the total of the number of wake-enabled devices installed (PCI and AGP) multiplied by the standby current requirement.
4. Add, from the PCI 2.2 slots (nonwake-enabled) row, the total of the number of wake-enabled devices installed (PCI and AGP) multiplied by the standby current requirement.

5. Add all additional wake-enabled devices' and nonwake-enabled devices' standby current requirements as applicable.
6. Add all the required current totals from steps 1 through 5 to determine the total estimated standby current power supply requirement.

Table 3. Standby Current Requirements

Instantly Available Current Support	Description	Standby Current Requirements (mA)
Estimate for integrated board components	Total for the D850GB board	770
Estimate for add-on components (Add to integrated board components shown above)	PS/2 ports*	345
	PCI 2.2 slots (wake-enabled)	375
	PCI 2.2 slots (nonwake-enabled)	100
	WOL header	525
	CNR* (wake enabled)	875
	CNR* (non-wake enabled)	40
	USB ports*	700

* Dependent upon system configuration

NOTE

PCI requirements are calculated by totaling the following:

- *One wake-enabled device @ 375 mA*
- *Five non wake-enabled devices @ 20 mA each*

PS/2 Ports requirements per the IBM PS/2 Port Specification (Sept 1991):

- *Keyboard @ 275 mA*
- *Mouse @ 70 mA*

USB requirements are calculated by totaling the following:

- *One wake-enabled device @ 500 mA*
- *USB hub @ 100 mA*
- *Three USB non-wake-enabled devices @ 2.5 mA each*

The USB ports are limited to a combined total of 700 mA.

Resume on Ring

The operation of Resume on Ring can be summarized as follows:

- Resumes operation from either the APM sleep mode or the ACPI S1 state
- Requires only one call to access the computer
- Detects incoming call similarly for external and internal modems
- Requires modem interrupt be unmasked for correct operation

2 Installing and Replacing Desktop Board Components

This chapter tells you how to:

- Install and remove an AGP retention mechanism and card
- Install the I/O shield
- Install and remove the board
- Install the processor retention mechanism and board in the chassis
- Install a processor
- Install and remove memory
- Replace the battery
- Connect the IDE cable
- Set the jumpers
- Clear passwords

Before You Begin

⚠ CAUTION

Before you install this board in a chassis, see Appendix B for regulatory requirements and precautions.

- Always follow the steps in each procedure in the correct order.
- Set up a log to record information about your computer, such as model, serial numbers, installed options, and configuration information.
- Electrostatic discharge (ESD) can damage components. Perform the procedures described in this chapter only at an ESD workstation using an antistatic wrist strap and a conductive foam pad. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the computer chassis.

⚠ WARNINGS

The procedures in this chapter assume familiarity with the general terminology associated with personal computers and with the safety practices and regulatory compliance required for using and modifying electronic equipment.

Disconnect the computer from its power source and from any telecommunications links, networks, or modems before performing any of the procedures described in this chapter. Failure to disconnect power, telecommunications links, networks, or modems before you open the computer or perform any procedures can result in personal injury or equipment damage. Some circuitry on the board can continue to operate even though the front panel power button is off.

Installing and Removing an AGP Retention Mechanism and Card

The AGP connector supports 1.5 V 4X and 2X AGP cards. Newer cards have a retention notch as shown in Figure 3. When using notched cards, install the AGP card retention mechanism before installing a card. The AGP card retention mechanism is not used with unnotched cards.
Pages 22–25 describe:

- Installing the AGP card retention mechanism
- Installing an AGP card
- Removing an AGP card from the retention mechanism
- Removing the AGP card retention mechanism

Installing the AGP Card Retention Mechanism

⚠ CAUTION

Install the AGP card retention mechanism (RM) only when using an AGP card with a retention notch (A) as shown in Figure 3. Use of the RM with an unnotched card may impair video operation. If you need to remove the RM, follow the instructions on page 25.

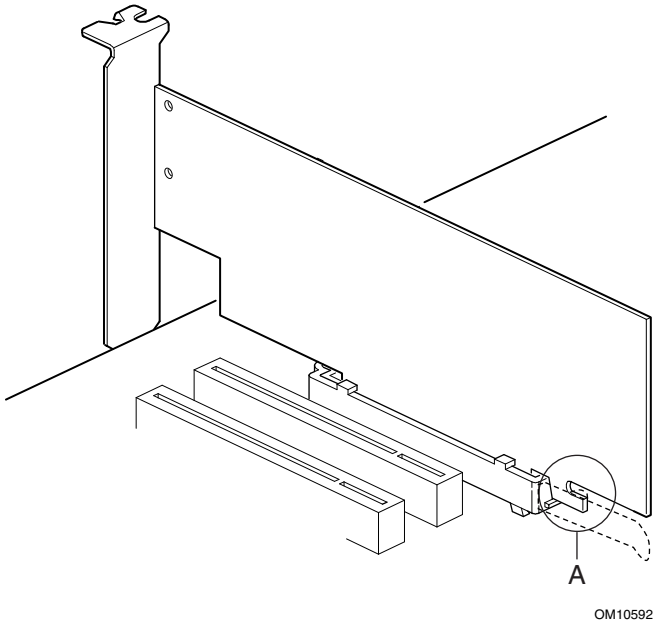


Figure 3. AGP Card with Retention Notch

The AGP card RM (see Figure 4) encloses the board's AGP connector and stabilizes the AGP card. Place the board (component side up) on a flat, supportive surface, preferably on the anti-static bag in which the board was shipped in. Follow the steps outlined below to attach the RM (A) to the AGP connector (B):

1. Locate the AGP connector (J5E1) on the board as shown below. Note that the board's silkscreen (C) indicates the correct final position of the lever (D) on the RM.

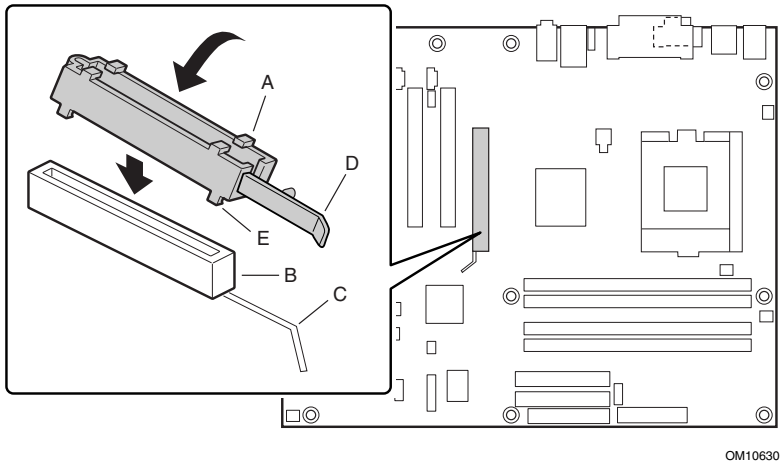
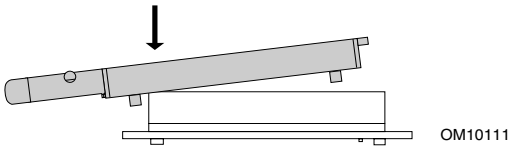
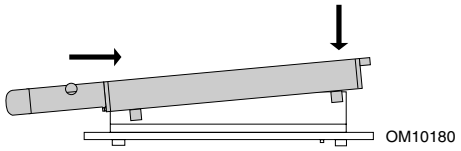


Figure 4. Installing the AGP Card Retention Mechanism

2. Position the RM over the AGP connector as shown below.



3. Push the lever end of the RM in the direction of the arrow until the two rearmost tabs (E) spread over the end of the AGP connector.



4. Push the free end of the RM over the other end of the AGP connector and press down evenly on both ends of the RM until all four tabs click underneath the AGP connector. Do not apply unnecessary pressure to avoid damaging the board.

Installing an AGP Card

Follow these instructions to install an AGP card:

1. Place the AGP card in the AGP connector.
2. Press down on the card until it is completely seated in the AGP connector and the card retention notch snaps into place around the RM pin.
3. Secure the card's metal bracket to the chassis back panel with a screw.

Removing an AGP Card from the Retention Mechanism

Follow these instructions to remove an AGP card from the retention mechanism:

1. Remove the screw (B) that secures the card's metal bracket (A) to the chassis back panel.
2. Push back on the retention mechanism lever (D), as shown in Figure 5, until the retention pin (C) completely clears the notch in the card.
3. Pull the card straight up (E).

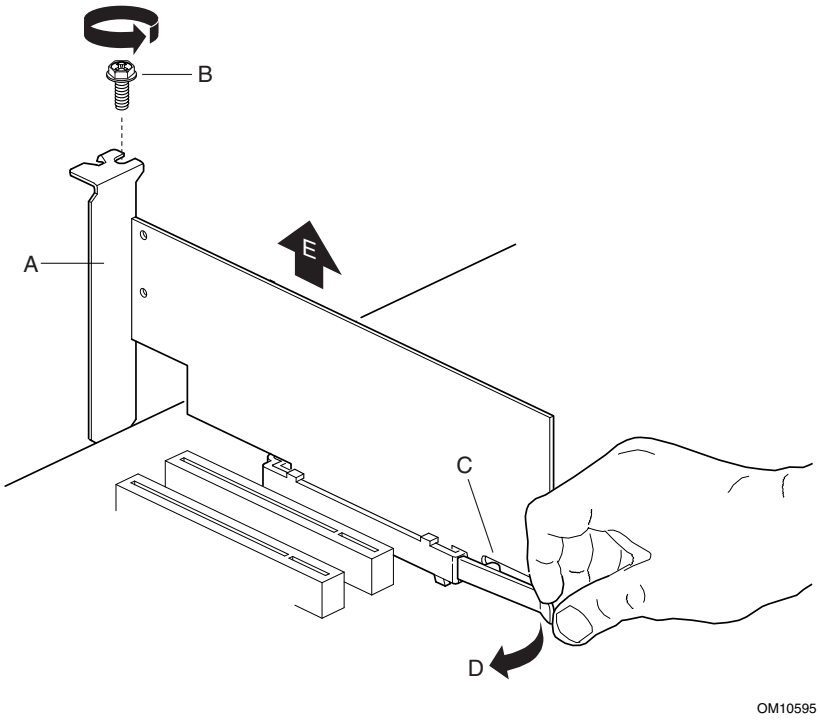


Figure 5. Removing the AGP Card

Removing the AGP Card Retention Mechanism

Follow these instructions to remove the AGP card retention mechanism:

1. Using diagonal cutters (A), cut the loop (B) joining the two sides of the retention mechanism (see Figure 6).
2. Spread the sides of the retention mechanism (C) and lift the retention mechanism off of the AGP connector.

NOTE

Once removed using this method, the AGP RM cannot be reused.

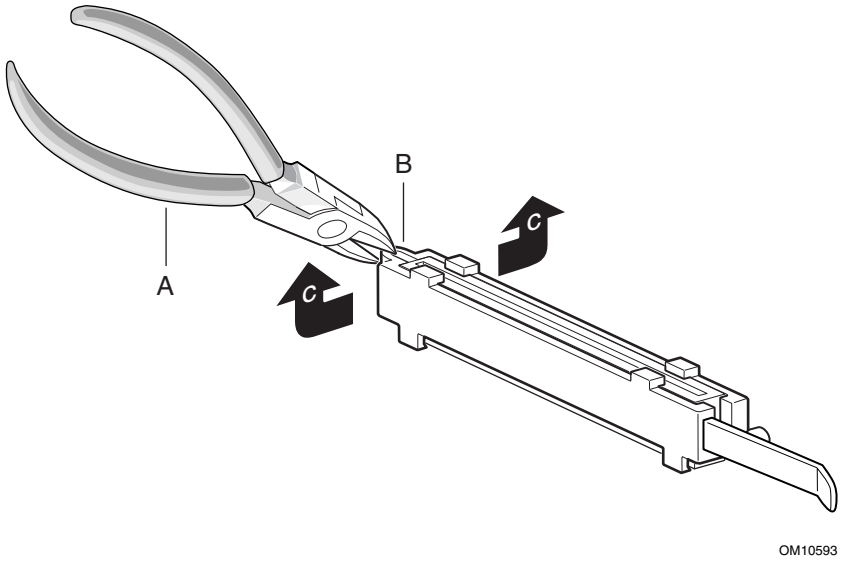


Figure 6. Removing the AGP Card Retention Mechanism

Installing the I/O Shield

The board comes with an I/O shield. When installed in the chassis, the shield blocks radio frequency transmissions, protects internal components from dust and foreign objects, and promotes correct airflow within the chassis.

Install the I/O shield before installing the board in the chassis. Place the shield inside the chassis as shown in Figure 7 and Figure 8. Press the shield into place so that it fits tightly and securely. If the shield doesn't fit, obtain a properly-sized shield from the chassis supplier.

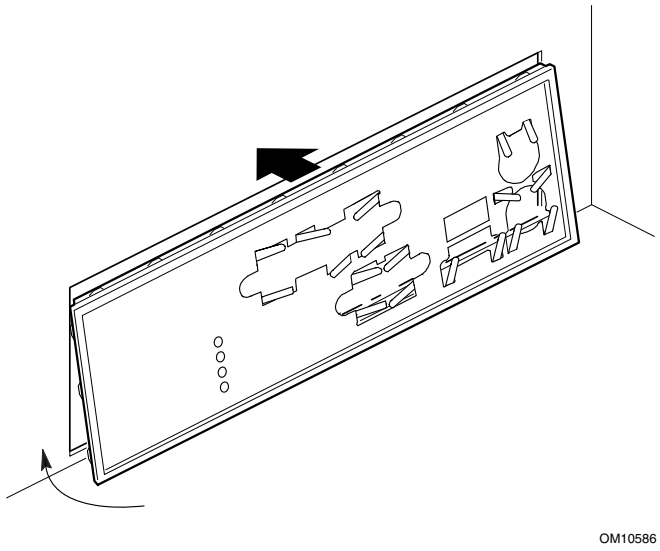


Figure 7. Installing the D850GB I/O Shield

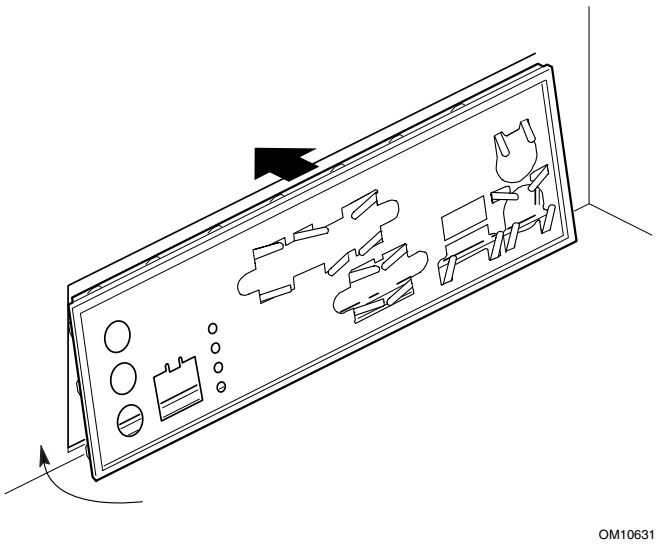


Figure 8. Installing the D850GBAL I/O Shield

Installing and Removing the Desktop Board

Refer to your chassis manual for instructions on installing and removing the board. The board is secured to the chassis by 10 screws. Figure 9 shows the locations of the mounting screw holes.

Do not install screws around the processor socket at this time.

NOTES

You will need a Phillips (#2 bit) screwdriver.

Refer to Appendix B for regulatory requirements and installation instructions and precautions.

WARNING

This procedure should be done only by qualified technical personnel. Disconnect the computer from its power source before performing the procedures described here. Failure to disconnect the power before you open the computer can result in personal injury or equipment damage.

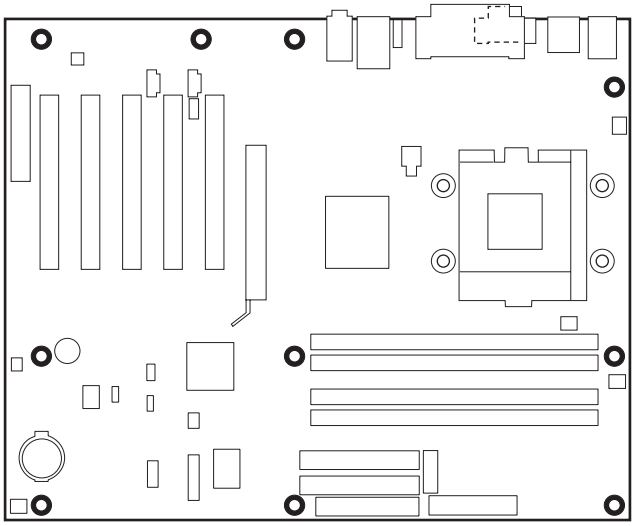


Figure 9. Location of the Mounting Screw Holes

Installing the Processor Retention Mechanisms

To install the processor retention mechanisms (RM), follow these instructions:

1. Locate the processor RM holes as seen in Figure 10.

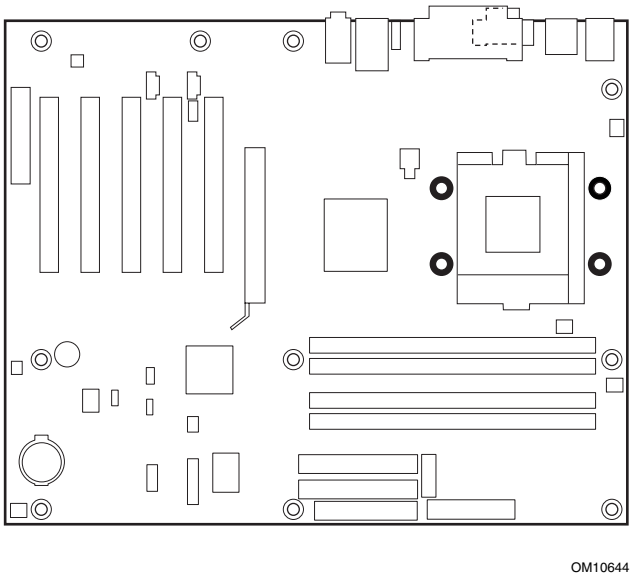


Figure 10. Location of the Processor RM Mounting Holes

2. Using the screws provided by the chassis manufacturer, install the processor RMs to the board and chassis as shown in Figure 11.

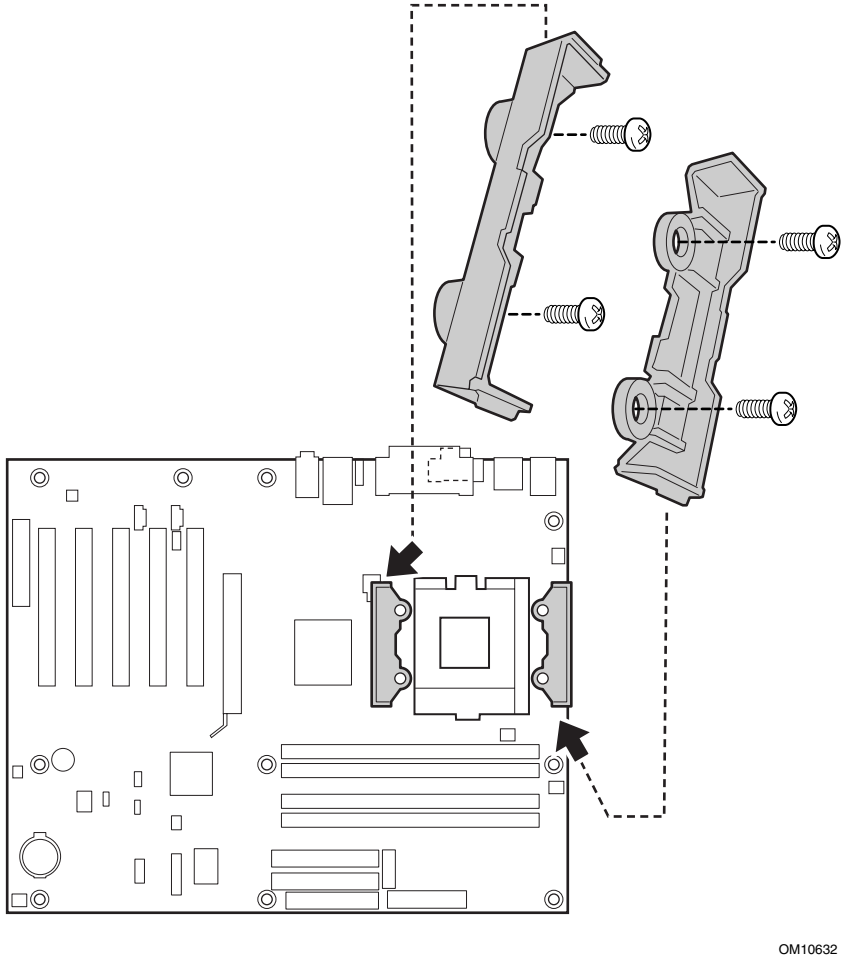


Figure 11. Installing the Processor RM

Installing and Removing a Processor

⚠ CAUTION

Before installing or removing the processor, make sure that AC power has been removed by unplugging the power cord from the computer; the standby power LED should not be lit (see Figure 2 on page 19). Failure to do so could damage the processor and the board.

To install a processor, follow these instructions (see Figure 12):

1. Observe the precautions in "Before You Begin" (see page 21).
2. Locate the processor socket and raise the socket lever completely
3. Install the processor so that the first pin (A) is aligned with the first pin location on the board silk screen.
4. Lower the lever to its original position.

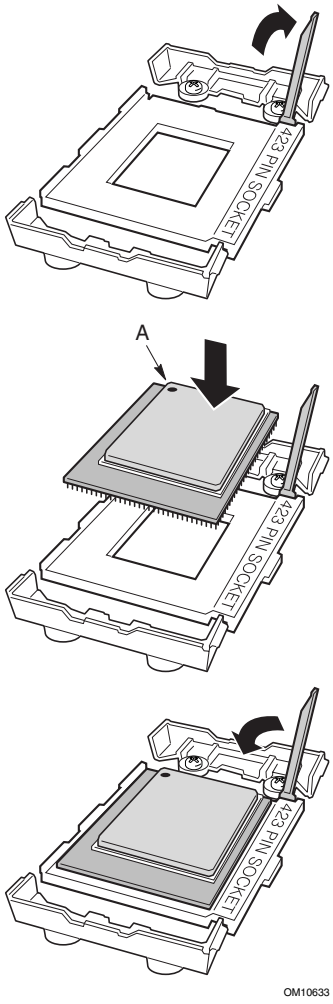


Figure 12. Installing a Processor

How to Install the Fan Heatsink

To install the fan heatsink, follow these instructions:

1. Apply about half of the thermal grease from the syringe to the center of the processor surface, as shown in Figure 13.

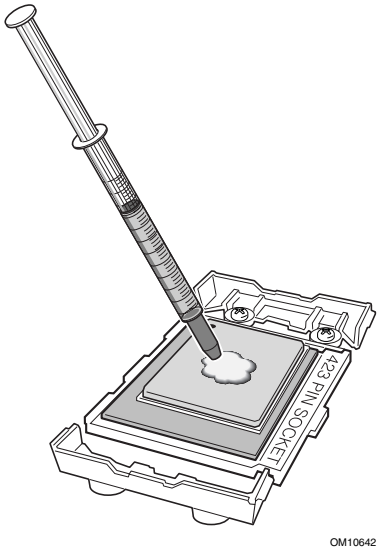


Figure 13. Applying Thermal Grease to the Processor Surface

2. Place the symmetrical fan heatsink on the processor so that the fan cable is facing the right edge of the board (see Figure 14).

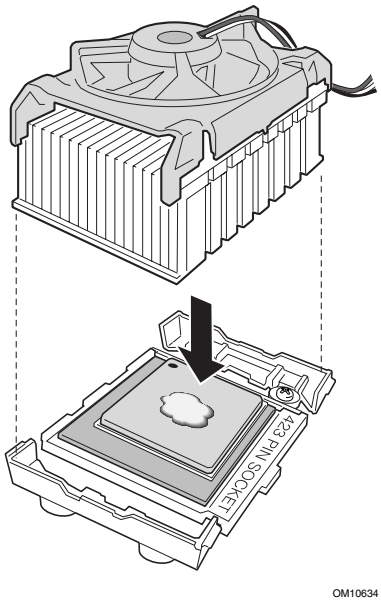


Figure 14. Attaching the Fan Heatsink

3. Install the heatsink clip on each side by attaching the opening at both ends of the clip (B) to the tabs on the processor RM. Then, fasten the side clip (A) to the processor RM until you hear a click. Repeat this procedure on the opposite side of the heatsink (see Figure 15).

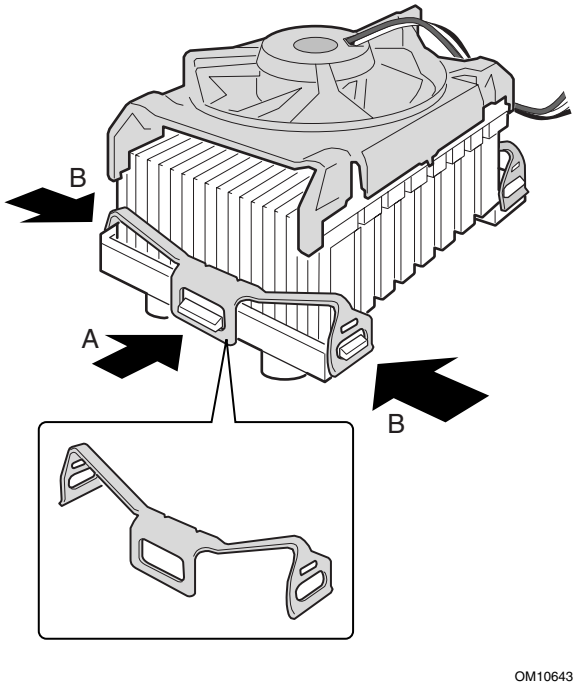


Figure 15. Installing the Heatsink Clips

4. Connect the processor fan cable to the processor fan connector (see Figure 16).

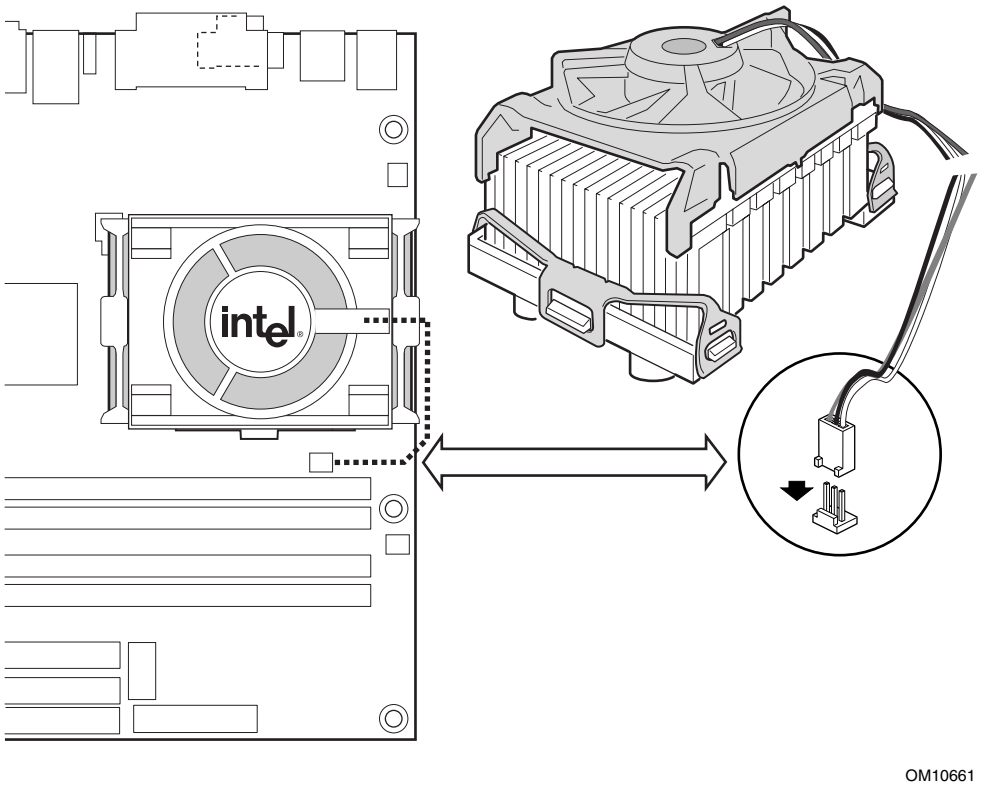


Figure 16. Connecting the Processor Fan Cable to the Processor Fan Connector

Removing a Processor

To remove a processor, follow these instructions:

1. Observe the precautions in "Before You Begin" (see page 21).
2. Disconnect the processor fan cable.
3. Detach the fan heatsink clips.
4. Raise the socket lever completely.
5. Remove the processor and fan heatsink.

Installing and Removing Memory

⚠ CAUTIONS

Before installing or removing RIMM modules, make sure that AC power has been removed by unplugging the power cord from the computer. The standby power indicator LED should not be lit (see Figure 2 on page 19) for the location of the standby power indicator LED location). Failure to do so could damage the memory and the board.

The board supports combinations of no more than 32 RDRAM components per RDRAM channel. If the total number of RDRAM components installed in all RIMM sockets exceeds 64, the computer will not boot.

A Continuity RIMM (CRIMM) module must be installed in any unused memory connector or the board will not boot.

Incorrect insertion of a RIMM module or a CRIMM module in a RIMM connector can damage the D850GB/D850GBAL board.

Installing Memory

The board's memory module consists of four sockets arranged as bank 0 and bank 1. The pair of sockets closest to the processor is for bank 0, as shown in Figure 17. The memory module requirements are listed in the Main Memory section on page 11.

When adding memory:

- Install a pair of RIMMs in the sockets in bank 0 first. The RIMMs must be identical in speed, size, and density.
- If desired memory configuration has been achieved in bank 0, install CRIMMs in the sockets in bank 1.
- If memory is to be installed in bank 1, the RIMM modules to be installed must be identical in size and density to each other, and match the speed of the RIMM modules in bank 0. The RIMM modules do not, however, need to match those in bank 0 in size and density. For example, if bank 0 has two 128 MB RIMMs of PC800 RDRAM, bank 1 would require PC800 RDRAM also, however, any other supported RIMM modules such as 64 MB or 192 MB could be used.
- The BIOS detects the size and type of installed memory.

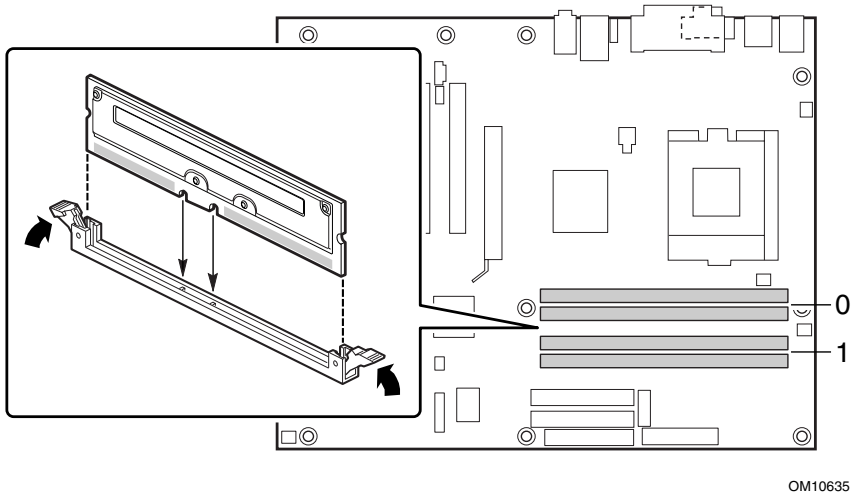


Figure 17. Installing a Memory Module

To install the memory modules, follow these steps:

1. Observe the precautions in “Before You Begin” (see page 21).
2. Holding the memory module by the edges, remove it from its antistatic package.
3. Make sure the clips at either end of the socket are pushed away from the socket.
4. Position the module above the socket. Align the two small notches in the bottom edge of the module with the keys in the socket.
5. Insert the bottom edge of the module into the socket.
6. When the module is seated, push down on the top edge of the module until the retaining clips snap into place. Make sure the clips are firmly in place.

Removing Memory

To remove a memory module, follow these steps:

1. Observe the precautions in "Before You Begin" (see page 21).
2. Turn off all peripheral devices connected to the computer. Turn off the computer. Disconnect the computer’s power cord from the AC power source (wall outlet or power adapter).
3. Remove the computer cover.
4. Gently spread the retaining clips at each end of the socket. The memory pops out of the socket.
5. Hold the memory module by the edges, lift it away from the socket, and store it in an antistatic package.
6. Reinstall and reconnect any parts you removed or disconnected to reach the memory module sockets.

Replacing the Battery

When your computer is turned off, a lithium battery maintains the current time-of-day clock and the values in CMOS RAM current. Figure 18 on page 37 shows the location of the battery.

The battery should last about seven years. When the battery begins to die, it loses voltage; when the voltage drops below a certain level, the BIOS Setup program settings stored in CMOS RAM (for example, the date and time) might not be accurate. Replace the battery with an equivalent one.

⚠ CAUTION

Refer to technically qualified persons only for replacement of battery.

⚠ CAUTION

Risk of explosion if the battery is replaced with an incorrect type. Batteries should be recycled where possible. Disposal of used batteries must be in accordance with local environmental regulations.

⚠ PRÉCAUTION

Risque d'explosion si la pile usagée est remplacée par une pile de type incorrect. Les piles usagées doivent être recyclées dans la mesure du possible. La mise au rebut des piles usagées doit respecter les réglementations locales en vigueur en matière de protection de l'environnement.

⚠ FORHOLDSREGEL

Eksplosionsfare, hvis batteriet erstattes med et batteri af en forkert type. Batterier bør om muligt genbruges. Bortskaffelse af brugte batterier bør foregå i overensstemmelse med gældende miljølovgivning.

⚠ OBS!

Det kan oppstå eksplosjonsfare hvis batteriet skiftes ut med feil type. Batterier bør sendes til gjenvinning hvis det er mulig. Brukte batterier bør kastes i henhold til gjeldende miljølovgivning.

⚠ VIKTIGT!

Risk för explosion om batteriet ersätts med felaktig batterityp. Batterier bör om möjligt återvinnas . Batterier ska kasseras enligt de lokala miljövårdsbestämmelserna.

⚠ VARO

Räjähdysvaara, jos pariston tyyppi on väärä. Paristot on kierrätettävä, jos se on mahdollista. Käytetyt paristot on hävitettävä paikallisten ympäristömääräysten mukaisesti.

⚠ VORSICHT

Bei falschem Einsetzen einer neuen Batterie besteht Explosionsgefahr. Die Batterie darf nur durch denselben oder einen entsprechenden, vom Hersteller empfohlenen Batterietyp ersetzt werden. Entsorgen Sie verbrauchte Batterien den Anweisungen des Herstellers entsprechend.

⚠ AVVERTIMENTO

Esiste il pericolo di un esplosione se la pila non viene sostituita in modo corretto. Utilizzare solo pile uguali o di tipo equivalente a quelle consigliate dal produttore. Per disfarsi delle pile usate, seguire le istruzioni del produttore.

⚠ PRECAUCIÓN

Existe peligro de explosión si la pila no se cambia de forma adecuada. Utilice solamente pilas iguales o del mismo tipo que las recomendadas por el fabricante del equipo. Para deshacerse de las pilas usadas, siga igualmente las instrucciones del fabricante.

To replace the battery, follow these steps:

1. Observe the precautions in "Before You Begin" (see page 21).
2. Turn off all peripheral devices connected to the computer. Disconnect the computer's power cord from the AC power source (wall outlet or power adapter).
3. Remove the computer cover.
4. Locate the battery on the board (see Figure 18).
5. With a medium flat-bladed screwdriver, gently pry the battery free from its connector. Note the orientation of the "+" and "-" on the battery.
6. Install the new battery in the connector, orienting the "+" and "-" correctly.
7. Replace the computer cover.

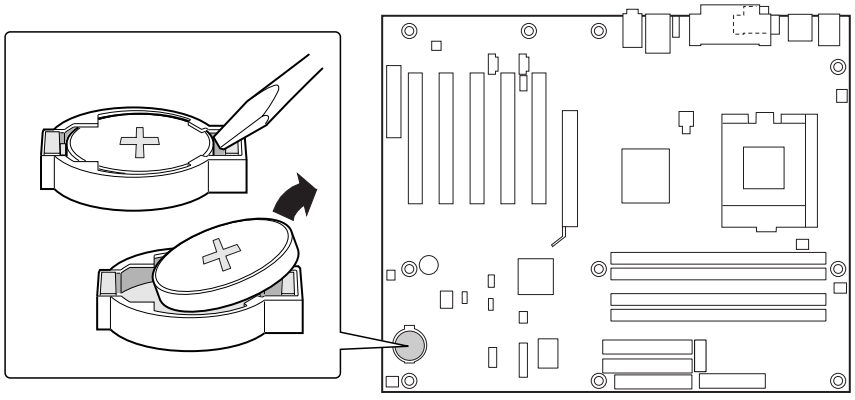


Figure 18. Removing the Battery

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Connecting the IDE Cable

The Intel boxed board package includes a 40-contact, 80-conductor IDE cable. It is capable of connecting two drives to the board. The cable supports the Ultra ATA-66/100 transfer protocol and is backward compatible with drives using slower IDE transfer protocols. Figure 19 shows the correct installation of the cable.

For correct function of the cable:

- Attach the cable end with the single connector to the board.
- Attach the cable end with the two closely spaced connectors to the drives.

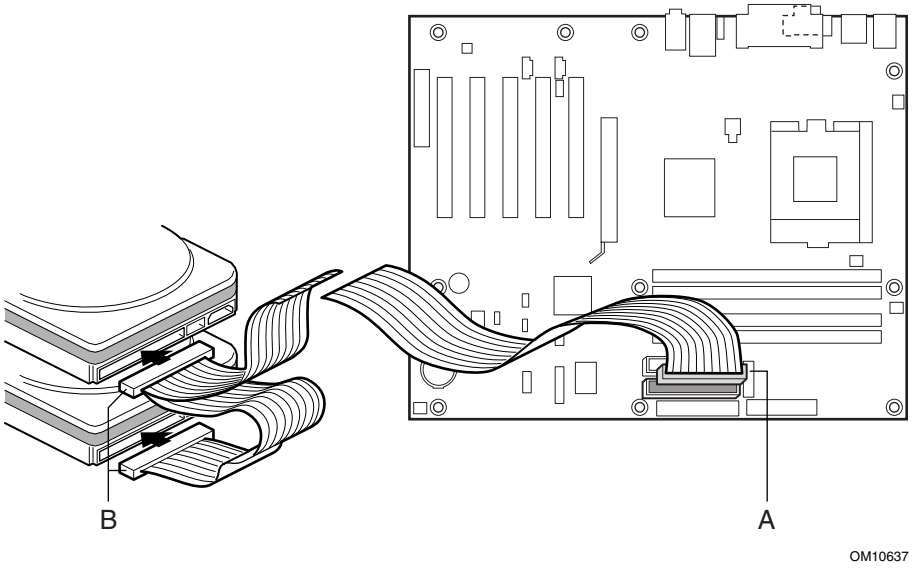


Figure 19. Connecting the IDE Cable

Setting the Jumpers

The board has two jumpers as shown in Figure 20:

- The BIOS configuration jumper
- The USB port 2 routing jumper

⚠ CAUTION

Always turn off the power and unplug the power cord from the computer before changing the jumper. Moving the jumper with the power on may result in unreliable computer operation.

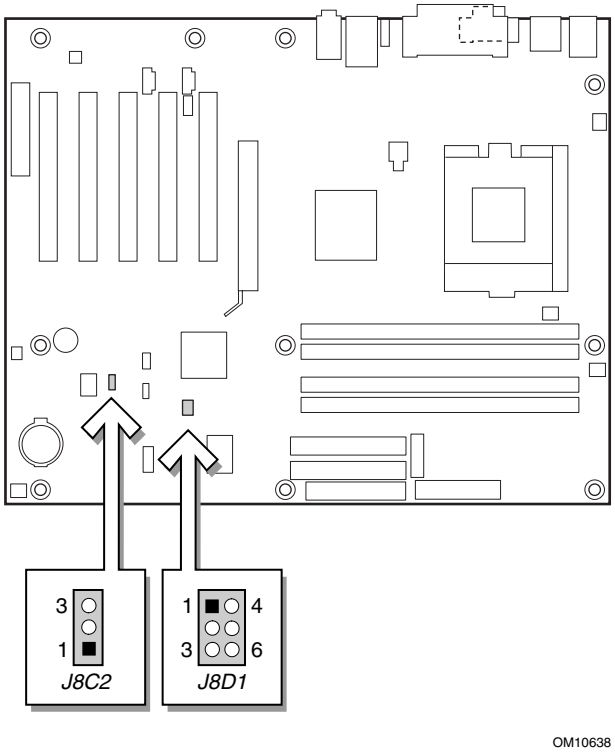


Figure 20. Location of the BIOS Configuration and USB Port 2 Routing Jumpers

Setting the BIOS Configuration Jumper

The three-pin BIOS jumper, shown in Figure 20, enables all board configurations to be done in BIOS Setup. Table 4 shows the jumper settings for the Setup program modes.

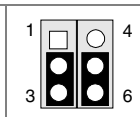
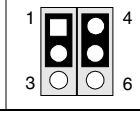
Table 4. Jumper Settings for the BIOS Setup Program Modes (J8C2)

Function / Mode	Jumper Setting	Configuration
Normal	1-2	The BIOS uses current configuration information and passwords for booting.
Configure	2-3	After the POST runs, the BIOS displays the maintenance menu. Use this menu to clear passwords.
Recovery	None	The BIOS attempts to recover the BIOS configuration. A recovery diskette is required.

Setting the USB Port 2 Routing Jumper

The USB port 2 routing jumper routes the signals of USB port 2. Table 5 describes the jumper settings for the front panel USB connector and CNR connector (D850GB only).

Table 5. USB Port 2 Routing Jumper Settings (J8D1)

Jumper Setting		Configuration
2-3 and 5-6		USB port 2 signals are routed to the front panel USB connector.
1-2 and 4-5		USB port 2 signals are routed to the CNR connector (D850GB only).

Clearing Passwords

This procedure assumes that the board is installed in the computer and the configuration jumper block is set to normal mode.

1. Observe the precautions in "Before You Begin" (see page 21).
2. Turn off all peripheral devices connected to the computer. Turn off the computer. Disconnect the computer's power cord from the AC power source (wall outlet or power adapter).
3. Remove the computer cover.
4. Find the configuration jumper block (see Figure 20).
5. Place the jumper on pins 2-3 as shown below.

6. Replace the cover, plug in the computer, turn on the computer, and allow it to boot.

7. The computer starts the Setup program. Setup displays the maintenance menu.
8. Use the arrow keys to select Clear Passwords. Press <Enter> and Setup displays a pop-up screen requesting that you confirm clearing the password. Select Yes and press <Enter>. Setup displays the maintenance menu again.
9. Press <F10> to save the current values and exit Setup.
10. Turn off the computer. Disconnect the computer's power cord from the AC power source.
11. Remove the computer cover.
12. To restore normal operation, place the jumper on pins 1-2 as shown below.

13. Replace the cover, plug in the computer, and turn on the computer.

3 Updating the BIOS

This chapter tells you how to update the BIOS by either using the Intel® Express BIOS Update utility or the Intel® Flash Memory Update Utility, and recovering the BIOS if an update fails.

Updating the BIOS with the Intel® Express BIOS Update Utility

With the Intel Express BIOS Update utility you can update the system BIOS while in the Windows environment. The BIOS file is included in an automated update utility which combines the functionality of the Intel Flash Memory Update Utility and the ease-of use of Windows-based installation wizards.

To update the BIOS with the Intel Express BIOS Update utility:

1. Go to the Intel World Wide Web site:
   http://developer.intel.com/design/motherbd/
2. Navigate to the D850GB page and click the Express BIOS Update utility file for the D850GB board's BIOS.
3. Download the file to your hard drive. (You can also save this file to a diskette. This is useful if you are updating the BIOS for multiple identical systems.)
4. Close all other applications. This step is required. Your system will be rebooted at the last Express BIOS Update window.
5. Double-click the executable file from the location on your hard drive where it was saved. This runs the update program.
6. Follow the instructions provided in the dialog boxes to complete the BIOS update.

Updating the BIOS with the Intel® Flash Memory Update Utility

Follow the steps described below to update the BIOS using the Intel Flash Memory Update Utility:

- Prepare for the update
- Update the BIOS
- Recover the BIOS if an update fails

Preparing for the Update

Before you update the BIOS, prepare by:

- Obtaining the BIOS update file
- Recording the current BIOS settings
- Creating a bootable media
- Creating the BIOS update media

Obtaining the BIOS Update File

You can update to a new version of the BIOS by using the BIOS update file. The BIOS update file is a compressed self-extracting archive that contains all the files you need to update the BIOS. The BIOS update file contains:

- New BIOS files
- BIOS recovery files
- Intel Flash Memory Update Utility

You can obtain the BIOS update file through your computer supplier or from the Intel World Wide Web site:

http://support.intel.com/support/motherboards/desktop/

✎ NOTE

Please review the instructions distributed with the update utility before attempting a BIOS update.

The Intel Flash Memory Update Utility allows you to:

- Update the BIOS in flash memory
- Update the language section of the BIOS

Recording the Current BIOS Settings

1. Boot the computer and press <F2> when you see the message:

```
Press <F2> Key if you want to run SETUP
```

✎ NOTE

Do not skip step 2. You will need these settings to configure your computer at the end of the update procedure.

2. Write down the current settings in the BIOS Setup program.

Creating Bootable Media

You can create bootable media with a:

- CD writer
- Normal diskette drive or an LS-120 diskette drive

Creating a Bootable CD

Follow the instructions provided with your CD writer to make a bootable CD using floppy emulation and bootable files.

Creating a Bootable Diskette

NOTE

When using an LS-120 diskette drive, you must use a 1.44 MB diskette as the bootable BIOS update diskette. The computer is unable to recover a BIOS from an LS-120 diskette.

To create a bootable diskette using a DOS system:

- Place an unformatted diskette in the diskette drive and format the diskette using the /s option. *Example:* `format a: /s`
- Alternatively, place a formatted diskette in the diskette drive and use the sys command. *Example:* `sys a:`

To create a bootable diskette using a non-DOS system:

1. Obtain the BIOS update file through your computer supplier or from the Intel World Wide Web site:
   http://support.intel.com/support/motherboards/desktop/
2. Copy the BIOS update file to a temporary directory on your hard disk.
3. Change to the temporary directory.
4. To extract the files, double click on the BIOS update file, for example, GBBIOSxx.EXE.
5. One of the extracted files is MK_BOOTZ.EXE. Double click on this file to extract the README.TXT file.
6. Follow the directions in the README.TXT file.

Creating the BIOS Update Media

1. Obtain the BIOS update file through your computer supplier or from the Intel World Wide Web site:
   http://support.intel.com/support/motherboards/desktop/
2. Copy the BIOS update file to a temporary directory on your hard disk.
3. From the C:\ prompt, change to the temporary directory.
4. To extract the file, type the name of the BIOS update file, for example, GBBIOSxx.EXE
5. Press <Enter>. The extracted file contains the following files:
   LICENSE.TXT
   BIOINSTR.TXT
   BIOS.EXE
   MK_BOOTZ.EXE
6. Read the LICENSE.TXT file, which contains the software license agreement, and the BIOINSTR.TXT file, which contains the instructions for the BIOS update.
7. Insert the bootable diskette into drive A.
8. To extract the BIOS.EXE file to the diskette, change to the temporary directory that holds the BIOS.EXE file and type:
   `BIOS A:`
9. Press <Enter>.
10. The diskette now holds the new BIOS files, the Intel Flash Update Utility, and the recovery files.

Updating the BIOS

⚠ CAUTION

The AUTOEXEC.BAT file provided with the update files updates the BIOS in two parts: first updating the boot block and displaying the "Operation completed successfully" message and then updating the BIOS core. You will be asked to reboot the system when the update process is complete. Do not interrupt the process or the system may not be capable of rebooting.

1. Boot the computer with the BIOS update diskette in drive A. During system boot, the AUTOEXEC.BAT file provided with the update files will automatically run the BIOS update process.
2. The AUTOEXEC.BAT file updates the BIOS in two parts: first updating the boot block and displaying the "Operation completed successfully" message and then updating the BIOS core.
3. When the update process is complete, the monitor will display a message telling you to remove the diskette and to reboot the system.
4. As the computer boots, check the BIOS identifier (version number) to make sure the update was successful. If a logo appears, press <Esc> to view the POST messages.
5. To enter the BIOS Setup program, press <F2> when you see the message:

   ```
   Press <F2> to Run SETUP
   ```

6. For proper operation, load the BIOS Setup program defaults. To load the defaults, press <F9>.
7. To accept the defaults, press <Enter>.
8. In Setup, enter the settings you wrote down before beginning the BIOS update.
9. To save the settings, press <F10>.
10. To accept the settings, press <Enter>.
11. Turn off the computer and reboot.

Recovering the BIOS

It is unlikely that anything will interrupt the BIOS update; however, if an interruption occurs, the BIOS could be damaged. The following steps explain how to recover the BIOS if an update fails. The following procedure uses recovery mode for the Setup program. See page 39 for more information on Setup modes.

✎ NOTE

Because of the small amount of code available in the boot block area, there is no video support. You will not see anything on the screen during this procedure. Monitor the procedure by listening to the speaker and looking at the diskette drive LED.

1. Turn off the computer, disconnect the computer's power cord, and disconnect all external peripherals.
2. Remove the computer cover and locate the configuration jumper block (J8C2) (see Figure 20).
3. Remove the jumper from all pins as shown below to set recovery mode for Setup.

4. Insert the bootable BIOS update diskette into diskette drive A.

5. Replace the computer cover, connect the power cord, turn on the computer, and allow it to boot. The recovery process will take a few minutes.
6. Listen to the speaker:
   - Upon applying power, drive A will begin to show activity. In about a minute, two beeps are heard and drive A activity ceases (temporarily) indicating the successful recovery of the BIOS core. Drive A activity will begin again followed by two more beeps indicating the successful recovery of the boot block. This sequence of events indicates a successful BIOS recovery.
   - A series of continuous beeps indicates a failed BIOS recovery.
7. If recovery fails, return to step 1 and repeat the recovery process.
8. If recovery is successful, turn off the computer, and disconnect its power cord.
9. Remove the computer cover and continue with the following steps.
10. On the jumper block (J8C2), reinstall the jumper back on pins 1-2 as shown below to set normal mode for Setup.

11. Leave the update diskette in drive A, replace the computer cover, and connect the computer's power cord.
12. Turn on the computer and continue with the BIOS update (see page 46).

4 Using the Setup Program

The BIOS Setup program can be used to view and change the BIOS settings for the computer. The BIOS Setup program is accessed by pressing the <F2> key after the Power-On Self-Test (POST) memory test begins and before the operating system boot begins.

NOTE

For reference purposes, you should write down the current Setup settings. When you make changes to the settings, update this record.

NOTE

The Setup menus described in this section apply to the desktop boards with BIOS identifier GB85010A.86A. Boards with other BIOS identifiers might have differences in some of the Setup menu screens.

The Setup screen menu bar is shown below.

```
Maintenance   Main      Advanced   Security  Power     Boot      Exit
```

Table 6 shows the BIOS Setup program menu bar.

Table 6. BIOS Setup Program Menu Bar

Maintenance	Main	Advanced	Security	Power	Boot	Exit
Clears passwords and Boot Integrity Service (BIS)* credentials, and configures extended configuration memory settings	Allocates resources for hardware components	Configures advanced features available through the chipset	Sets passwords and security features	Configures power management features	Selects boot options and power supply controls	Saves or discards changes to set program options

* For information about the BIS, refer to the Intel Web site at:

http://developer.intel.com/design/security/index1.htm

Table 7 shows the function keys available for menu screens.

Table 7. BIOS Setup Program Function Keys

BIOS Setup Program Function Key	Description
<←> or <→>	Selects a different menu screen
<↑> or <↓>	Moves cursor up or down
<Tab>	Moves cursor to the next field
<Enter>	Executes command or selects the submenu
<F9>	Load the default configuration values for the current menu
<F10>	Save the current values and exits the BIOS Setup program
<Esc>	Exits the menu

Maintenance Menu

Maintenance	Main	Advanced	Security	Power	Boot	Exit

The menu shown in Table 8 is used to clear the Setup passwords and enable extended configuration mode. Setup only displays this menu in configure mode. See page 39 for information about setting configure mode.

Table 8. Maintenance Menu

Feature	Options	Description
Processor Speed	Processor dependent	Displays the processor speed.
Clear All Passwords	• **Yes (default)** • No	Clears the user and administrative passwords.
Clear BIS * Credentials	• **Yes (default)** • No	Clears the Wired for Management Boot Integrity Service (BIS) credentials.
Extended Configuration	• **Default (default)** • User-Defined	Invokes the Extended Configuration submenu.
CPU Information	No options	Displays processor information.
CPU Stepping Signature	No options	Displays the processor's stepping signature.
CPU Microcode Update Revision	No options	Displays the processor's microcode update revision.

* For information about the BIS, refer to the Intel Web site at:

http://developer.intel.com/design/security/index1.htm

Extended Configuration Submenu

Maintenance	Main	Advanced	Security	Power	Boot	Exit
Extended Configuration						

This submenu shown in Table 9 is used to set system control and video memory cache mode. This submenu becomes available when User Defined is selected under Extended Configuration.

Table 9. Extended Configuration Submenu

Feature	Options	Description
Extended Configuration	• **Default (default)** • User-Defined	*User-Defined* allows setting memory control and video memory cache mode. If selected here, will also display in the Advanced Menu as "Extended Menu: *Used*."
Video Memory Cache Mode	• USWC	Selects Uncacheable Speculative Write-Combining (USWC) video memory cache mode. Full 32 byte contents of the Write Combining buffer are written to memory as required. Cache lookups are not performed. Both the video driver and the application must support Write Combining.
	• **UC (default)**	Selects Uncacheable (UC) video memory cache mode. This setting identifies the video memory range as uncacheable by the processor. Memory writes are performed in program order. Cache lookups are not performed. Well suited for applications not supporting Write Combining.

Main Menu

Maintenance	**Main**	Advanced	Security	Power	Boot	Exit

Table 10 describes the Main Menu. This menu reports processor and memory information and is used to configure the system date and system time.

Table 10. Main Menu

Feature	Options	Description
BIOS Version	No options	Displays the version of the BIOS.
Processor Type	No options	Displays processor type.
Processor Speed	No options	Displays processor operating frequency.
System Bus Frequency	No options	Displays the system bus frequency.
Cache RAM	No options	Displays the size of second-level cache and whether it is ECC-capable.
Total Memory	No options	Displays the total amount of RAM.
RIMM 1 RIMM 2 RIMM 3 RIMM 4	No options	Displays the amount and type of RAM installed in the memory banks.
Language	• **English (default)** • Espanol • Deutsche • Italiano • Français	Selects the default language used by the BIOS.
Memory Configuration	• Non-ECC • **ECC (default)**	Allows the user to enable error reporting if the system and all installed memory supports ECC. If non-ECC memory is installed, BIOS will detect and change setting to non-ECC.
System Time	Hour, minute, and second	Specifies the current time.
System Date	Day of the week, month, day, and year	Specifies the current date.

Advanced Menu

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit

Table 11 describes the Advanced Menu. This menu is used to set advanced features that are available through the chipset.

Table 11. Advanced Menu

Feature	Options	Description
Extended Configuration	No options	If *Used* is highlighted, *User-Defined* has been selected in Extended Configuration under the Maintenance Menu.
PCI Configuration	No options	Configures individual PCI slot's IRQ priority. When selected, displays the PCI Configuration submenu.
Boot Configuration	No options	Configures Plug & Play and the Numlock key, and resets configuration data. When selected, displays the Boot Configuration submenu.
Peripheral Configuration	No options	Configures peripheral ports and devices. When selected, displays the Peripheral Configuration submenu.
IDE Configuration	No options	Specifies type of connected IDE device.
Diskette Configuration	No options	When selected, displays the Diskette Configuration submenu.
Event Log Configuration	No options	Configures Event Logging. When selected, displays the Event Log Configuration submenu.
Video Configuration	No options	Configures video features. When selected, displays the Video Configuration submenu.

PCI Configuration Submenu

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit

PCI Configuration
Boot Configuration
Peripheral Configuration
IDE Configuration
Diskette Configuration
Event Log Configuration
Video Configuration

The submenu shown in Table 12 is used to configure the IRQ priority of PCI slots individually.

Table 12. PCI Configuration Submenu

Feature	Options	Description
PCI Slot 1 IRQ Priority	• **Auto (default)** 3 5 9 10 11	Allows selection of IRQ priority.
PCI Slot 2 IRQ Priority	• **Auto (default)** 3 5 9 10 11	Allows selection of IRQ priority.
PCI Slot 3 IRQ Priority	• **Auto (default)** 3 5 9 10 11	Allows selection of IRQ priority. IRQ Priority selections for PCI slots 3 and 5 are linked. Selections made to PCI Slot 3 IRQ Priority are repeated in PCI Slot 5 IRQ Priority.
PCI Slot 4 IRQ Priority	• **Auto (default)** 3 5 9 10 11	Allows selection of IRQ priority.
PCI Slot 5 IRQ Priority	No options	Always set to Auto.

Boot Configuration Submenu

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit

PCI Configuration
Boot Configuration
Peripheral Configuration
IDE Configuration
Diskette Configuration
Event Log Configuration
Video Configuration

The submenu shown in Table 13 is used to set the Plug & Play options, reset configuration data, and the power-on state of the Numlock key.

Table 13. Boot Configuration Submenu

Feature	Options	Description
Plug & Play O/S	• **No (default)** • Yes	Specifies if manual configuration is desired. *No* lets the BIOS configure all devices. This setting is appropriate when using a Plug and Play operating system. *Yes* lets the operating system configure Plug and Play devices not required to boot the system. This option is available for use during lab testing.
Reset Config Data	• **No (default)** • Yes	*No* does not clear the PCI/PnP configuration data stored in flash memory on the next boot. *Yes* clears the PCI/PnP configuration data stored in flash memory on the next boot.
Numlock	• Off • **On (default)**	Specifies the power-on state of the Numlock feature on the numeric keypad of the keyboard.

Peripheral Configuration Submenu

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit

PCI Configuration
Boot Configuration
Peripheral Configuration
IDE Configuration
Diskette Configuration
Event Log Configuration
Video Configuration

This submenu shown in Table 14 is used to enable onboard devices and USB legacy support.

Table 14. Peripheral Configuration Submenu

Feature	Options	Description
Serial Port A	• Disabled • Enabled • **Auto (default)**	Configures serial port A. *Auto* assigns the first free COM port, normally COM 1, the address 3F8h, and the interrupt IRQ4. An * (asterisk) displayed next to an address indicates a conflict with another device.
Base I/O address (This feature is displayed only if Serial Port A is set to *Enabled*.)	• **3F8 (default)** • 2F8 • 3E8 • 2E8	Specifies the base I/O address for serial port A, if serial port A is set to *Enabled*.
Interrupt (This feature is displayed only if Serial Port A is set to *Enabled*.)	• IRQ 3 • **IRQ 4 (default)**	Specifies the interrupt for serial port A, if serial port A is set to *Enabled*.
Parallel port	• Disabled • Enabled • **Auto (default)**	Configures the parallel port. *Auto* assigns LPT1 the address 378h and the interrupt IRQ7. An * (asterisk) displayed next to an address indicates a conflict with another device.
Mode	• Output Only • **Bi-directional (default)** • EPP • ECP	Selects the mode for the parallel port. Not available if the parallel port is disabled. *Output Only* operates in AT† -compatible mode. *Bi-directional* operates in PS/2-compatible mode. *EPP* is Extended Parallel Port mode, a high-speed bi-directional mode. *ECP* is Enhanced Capabilities Port mode, a high-speed bi-directional mode.

continued

Table 14. Peripheral Configuration Submenu (continued)

Feature	Options	Description
Base I/O address (This feature is displayed only if Parallel Port is set to *Enabled*.)	• **378 (default)** • 278	Specifies the base I/O address for the parallel port.
Interrupt (This feature is displayed only if Parallel Port is set to *Enabled*.)	• IRQ 5 • **IRQ 7(default)**	Specifies the interrupt for the parallel port.
DMA (This feature is present only when Parallel Port mode is set to *ECP*.)	• 1 • **3 (default)**	Specifies the DMA channel.
Audio Device	• Disabled • **Enabled (default)**	Enables or disables the onboard audio subsystem.
LAN Device	• Disabled • **Enabled (default)**	Enables or disables the LAN device.
Legacy USB Support	• Disabled • **Enabled (default)**	Enables or disables USB legacy support.

IDE Configuration Submenu

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit

PCI Configuration
Boot Configuration
Peripheral Configuration
IDE Configuration
Diskette Configuration
Event Log Configuration
Video Configuration

This submenu shown in Table 15 is used to configure IDE device options.

Table 15. IDE Configuration Submenu

Feature	Options	Description
IDE Controller	• Disabled • Primary • Secondary • **Both (default)**	Specifies the integrated IDE controller. *Primary* enables only the primary IDE controller. *Secondary* enables only the secondary IDE controller. *Both* enables both IDE controllers.
Hard Disk Pre-Delay	• **Disabled (default)** • 3 Seconds • 6 Seconds • 9 Seconds • 12 Seconds • 15 Seconds • 21 Seconds • 30 Seconds	Specifies the hard disk drive pre-delay.
Primary IDE Master	No options	Reports type of connected IDE device. When selected, displays the Primary IDE Master submenu.
Primary IDE Slave	No options	Reports type of connected IDE device. When selected, displays the Primary IDE Slave submenu.
Secondary IDE Master	No options	Reports type of connected IDE device. When selected, displays the Secondary IDE Master submenu.
Secondary IDE Slave	No options	Reports type of connected IDE device. When selected, displays the Secondary IDE Slave submenu.

Primary/Secondary IDE Master/Slave Submenus

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit

Boot Configuration	
Peripheral Configuration	
IDE Configuration	➜ **Primary IDE Master**
Diskette Configuration	**Primary IDE Slave**
Event Log Configuration	**Secondary IDE Master**
Video Configuration	**Secondary IDE Slave**

There are four IDE submenus: Primary master, primary slave, secondary master, and secondary slave. Table 16 shows the format of these IDE submenus. For brevity, only one example is shown.

Table 16. Primary/Secondary IDE Master/Slave Submenus

Feature	Options	Description
Drive Installed	None	Displays the type of drive installed.
Type	• None • User • **Auto (default)** • CD-ROM • ATAPI Removable • Other ATAPI • IDE Removable	Specifies the IDE configuration mode for IDE devices. *User* allows capabilities to be changed. *Auto* fills-in capabilities from ATA/ATAPI device.
Maximum Capacity	None	Displays the capacity of the drive.
LBA Mode Control	• Disabled • **Enabled (default)**	Enables or disables LBA mode control.
Multi-sector Transfers	• Disabled • 2 Sectors • 4 Sectors • 8 Sectors • **16 Sectors (default)**	Specifies the number of sectors per block for transfers from the hard disk drive to memory. Check the hard disk drive's specifications for optimum setting.
PIO Mode	• **Auto (default)** • 0 • 1 • 2 • 3 • 4	Specifies the PIO mode.

continued

Table 16. Primary/Secondary IDE Master/Slave Submenus (continued)

Feature	Options	Description
Ultra DMA	• **Disabled (default)** • Mode 0 • Mode 1 • Mode 2 • Mode 3 • Mode 4 • Mode 5	Specifies the Ultra DMA mode for the drive.
Cable Detected	None	Displays the type of cable connected to the IDE interface: 40-conductor or 80-conductor (for Ultra ATA-100 devices).

Diskette Configuration Submenu

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit

PCI Configuration
Boot Configuration
Peripheral Configuration
IDE Configuration
Diskette Configuration
Event Log Configuration
Video Configuration

This submenu shown in Table 17 is used to configure the diskette drive.

Table 17. Diskette Configuration Submenu

Feature	Options	Description
Diskette Controller	• Disabled • **Enabled (default)**	Disables or enables the integrated diskette controller.
Floppy A	• Not Installed • 360 kB 5¼ inches • 1.2 MB 5¼ inches • 720 kB 3½ inches • **1.44/1.25 MB 3½ inches (default)** • 2.88 MB 3½ inches	Specifies the capacity and physical size of diskette drive A.
Diskette Write-Protect	• **Disabled (default)** • Enabled	Disables or enables write-protect for the diskette drive.

Event Log Configuration Submenu

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit

PCI Configuration
Boot Configuration
Peripheral Configuration
IDE Configuration
Diskette Configuration
Event Log Configuration
Video Configuration

The submenu shown in Table 18 is used to configure the event logging features.

Table 18. Event Log Configuration Submenu

Feature	Options	Description
Event Log	No options	Indicates if there is space available in the event log.
Event Log Validity	No options	Indicates if the contents of the event log are valid.
View Event Log	[Enter]	Displays the event log.
Clear All Event Logs	• **No (default)** • Yes	Clears the event log after rebooting.
Event Logging	• Disabled • **Enabled (default)**	Enables logging of events.
ECC Event Logging	• Disabled • **Enabled (default)**	Enables logging of ECC events.
Mark Events as Read	[Enter]	Marks all events as read.

Video Configuration Submenu

Maintenance	Main	**Advanced**	Security	Power	Boot	Exit

PCI Configuration
Boot Configuration
Peripheral Configuration
IDE Configuration
Diskette Configuration
Event Log Configuration
Video Configuration

The submenu shown in Table 19 is used to configure video features.

Table 19. Video Configuration Submenu

Feature	Options	Description
AGP Aperture Size	• **64 MB (default)** • 256 MB	Specifies the aperture size for the AGP video controller.
Primary Video Adapter	• **AGP (default)** • PCI	Selects primary video adapter to be used during boot.

Security Menu

Maintenance	Main	Advanced	**Security**	Power	Boot	Exit

The menu shown in Table 20 is used to set passwords and security features.

Table 20. Security Menu

If no password was entered previously:		
Feature	**Options**	**Description**
Supervisor Password Is	No options	Reports if there is a supervisor password set.
User Password Is	No options	Reports if there is a user password set.
Set Supervisor Password	Password can be up to seven alphanumeric characters.	Specifies the supervisor password.
Set User Password	Password can be up to seven alphanumeric characters.	Specifies the user password.
Clear User Password (Note 1)	• **Yes (default)** • No	Clears the user password.
User Access Level (Note 2)	• Limited • No access • View Only • **Full (default)**	Sets BIOS Setup Utility access rights for user level.
Unattended Start (Note 1)	• Enabled • **Disabled (default)**	*Enabled* allows system to complete the boot process without a password. The keyboard remains locked until a password is entered. A password is required to boot from a diskette.

Notes:

1. This feature appears only if a user password has been set.

2. This feature appears only if a supervisor password has been set.

Power Menu

Maintenance	Main	Advanced	Security	**Power**	Boot	Exit

The menu shown in Table 21 is used to set power management features.

Table 21. Power Menu

Feature	Options	Description
Power Management	• Disabled • **Enabled (default)**	Enables or disables the BIOS power management feature.
Inactivity Timer	• Off • 1 Minute • 5 Minutes • 10 Minutes • **20 Minutes (default)** • 30 Minutes • 60 Minutes • 120 Minutes	Specifies the amount of time before the computer enters standby mode.
Hard Drive	• Disabled • **Enabled (default)**	Enables power management for hard disks during standby modes.
Video Power-Down	• **Disabled (default)** • Standby • Suspend • Sleep	*Disabled* disables video power management. Other settings enable the video to be power managed. The other settings also specify the mode in which the monitor will be placed when entering a low power state.
ACPI Suspend State	• **S1 State (default)** • S3 State	Specifies the ACPI suspend state.

NOTE

When an ACPI-capable operating system is configured for ACPI, only the ACPI Suspend State option affects power management. The ACPI Suspend State is not supported if the system is configured for APM.

Boot Menu

Maintenance	Main	Advanced	Security	Power	**Boot**	Exit

The menu shown in Table 22 is used to set the boot features and the boot sequence.

Table 22. Boot Menu

Feature	Options	Description
Quiet Boot	• Disabled • **Enabled (default)**	*Disabled* displays normal POST messages. *Enabled* displays OEM graphic instead of POST messages.
Intel Rapid BIOS Boot	• Disabled • **Enabled (default)**	Enables the computer to boot without running certain POST tests.
Scan User Flash Area	• **Disabled (default)** • Enabled	Enables the BIOS to scan the flash memory for user binary files that are executed at boot time.
After Power Failure	• Stay Off • **Last State (default)** • Power On	Specifies the mode of operation if an AC power loss occurs. *Stay Off* keeps the power off until the power button is pressed. *Last State* restores the previous power state before power loss occurred. *Power On* restores power to the computer.
On Modem Ring	• **Stay Off (default)** • Power On	In APM mode only, specifies how the computer responds to an incoming call on an installed modem when the power is off.
On LAN	• Stay Off • **Power On (default)**	In APM mode only, determines how the system responds to a LAN wake up event.
On PME	• **Stay Off (default)** • Power On	In APM mode only, determines how the system responds to a PCI power management event.
On ACPI S5	• **Stay Off (default)** • Power On	In ACPI mode only, determines the action of the system when a LAN wake up event occurs.
1st Boot Device 2nd Boot Device 3rd Boot Device 4th Boot Device	• Floppy • ARMD-FDD (Note 1) • ARMD-HDD (Note 2) • IDE-HDD (Note 3) • ATAPI CD-ROM • Intel UNDI, PXE 2.0 (Note 4) • Disabled	Specifies the boot sequence from the available devices. To specify boot sequence: 1. Select the boot device with <↑> or <↓>. 2. Press <Enter> to set the selection as the intended boot device. Not all of the devices in this list are available as second, third, and fourth boot devices. The default settings for the first through fifth boot devices are, respectively: • Floppy • IDE-HDD • ATAPI CD-ROM • Intel UNDI, PXE 2.0 • Disabled

continued

Table 22. Boot Menu (continued)

Feature	Options	Description
IDE Drive Configuration	[Enter]	Configures IDE drives. When selected, displays the IDE Drive Configuration submenu.

Notes:

1. ARMD-FDD = ATAPI removable device - floppy disk drive
2. ARMD-HDD = ATAPI removable device - hard disk drive
3. HDD = Hard disk drive
4. This boot device is available only when the onboard LAN subsystem is present.

IDE Drive Configuration Submenu

Maintenance	Main	Advanced	Security	Power	**Boot**	Exit
					IDE Drive Configuration	

The submenu shown in Table 23 is used to set the order in which the IDE drives boot. Changing the boot-order of a given drive causes the boot-order for the other drives to change automatically to accommodate your selection.

Table 23. IDE Drive Configuration Submenu

Feature	Options	Description
Primary Master IDE	**1st IDE (default)** 1 through 4	Allows you to select the order in which the Primary Master IDE drive boots.
Primary Slave IDE	**2nd IDE (default)** 1 through 4	Allows you to select the order in which the Primary Slave IDE drive boots.
Secondary Slave IDE	**3rd IDE (default)** 1 through 4	Allows you to select the order in which the Secondary Master IDE drive boots.
Secondary Slave IDE	**4th IDE (default)** 1 through 4	Allows you to select the order in which the Secondary Slave IDE drive boots.

Exit Menu

Maintenance	Main	Advanced	Security	Power	Boot	**Exit**

The menu shown in Table 24 is used to exit the BIOS Setup program, saving changes, and loading and saving defaults.

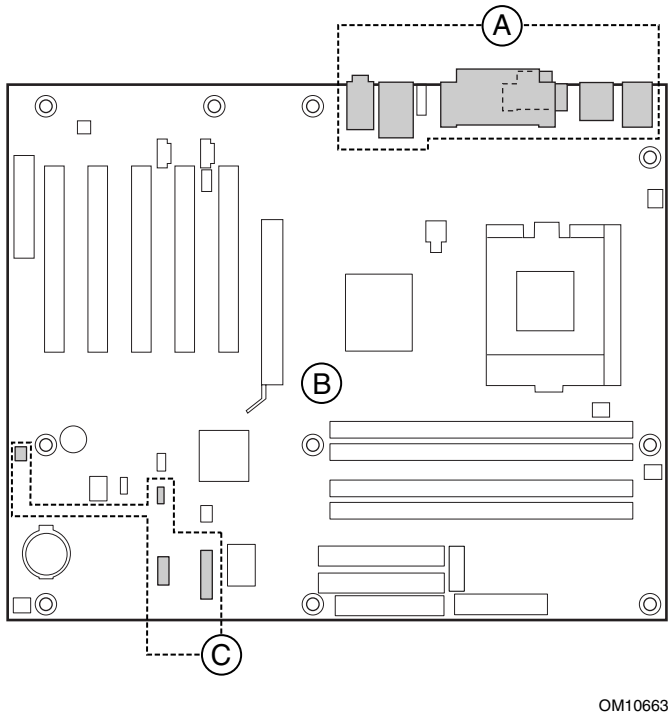
Table 24. Exit Menu

Feature	Description
Exit Saving Changes	Exits and saves the changes in CMOS SRAM.
Exit Discarding Changes	Exits without saving any changes made in the BIOS Setup program.
Load Setup Defaults	Loads the factory default values for all the Setup options.
Load Custom Defaults	Loads the custom defaults for Setup options.
Save Custom Defaults	Saves the current values as custom defaults. Normally, the BIOS reads the Setup values from flash memory. If this memory is corrupted, the BIOS reads the custom defaults. If no custom defaults are set, the BIOS reads the factory defaults.
Discard Changes	Discards changes without exiting Setup. The option values present when the computer was turned on are used.

5 Technical Reference

Board Connectors

The board's connectors can be divided into three groups, as shown in Figure 21.



A Back panel connectors (see page 70)

B Midboard connectors (see page 71)

C Front panel connectors (see page 74)

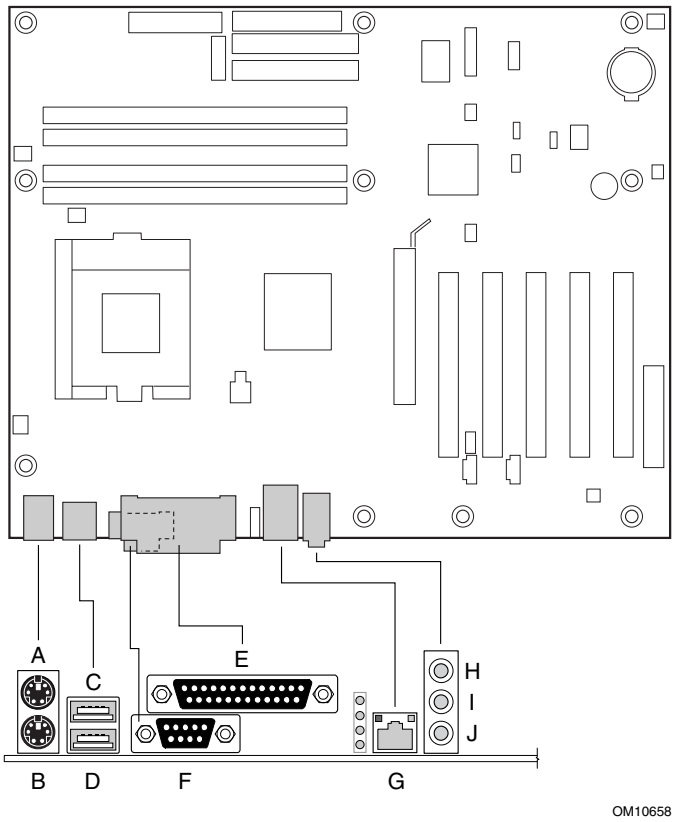
Figure 21. Connector Groups

⚠ CAUTION

Many of the midboard and front panel connectors provide operating voltage (+5 V DC and +12 V DC, for example) to devices inside the computer chassis, such as fans and internal peripherals. These connectors are not overcurrent protected. Do not use these connectors for powering devices external to the computer chassis. A fault in the load presented by the external devices could cause damage to the computer, the interconnecting cable, and the external devices themselves.

Back Panel Connectors

Figure 22 shows the back panel connectors on the board.



Item	Description	Color
A	PS/2 mouse port	Green
B	PS/2 keyboard port	Purple
C	USB port 0	Black
D	USB port 1	Black
E	Parallel port	Burgundy
F	Serial port	Teal
G	RJ-45	Black
H	Audio line in	Light blue
I	Audio line out	Lime green
J	Mic in	Pink

Figure 22. Back Panel Connectors

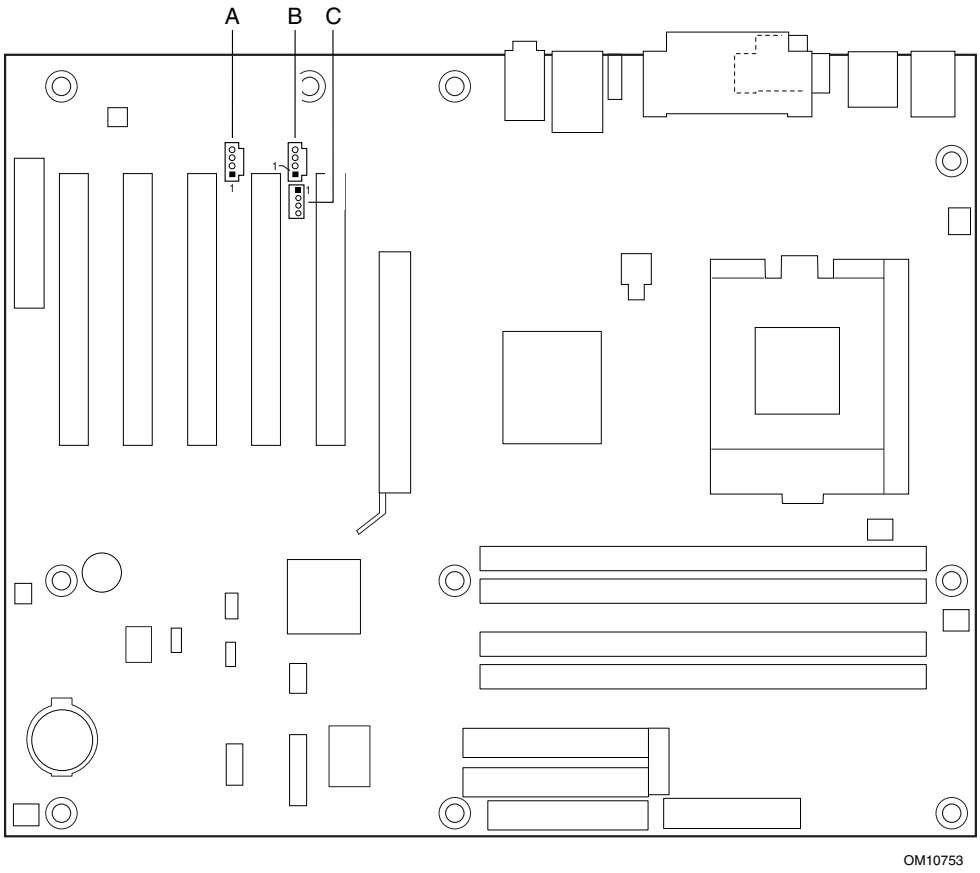
NOTE

The line out connector, located on the back panel, is designed to power either headphones or amplified speakers only. Poor audio quality may occur if passive (non-amplified) speakers are connected to this output.

Midboard Connectors

Audio Connectors (D850GBAL only)

Figure 23 shows the location of the audio connectors.

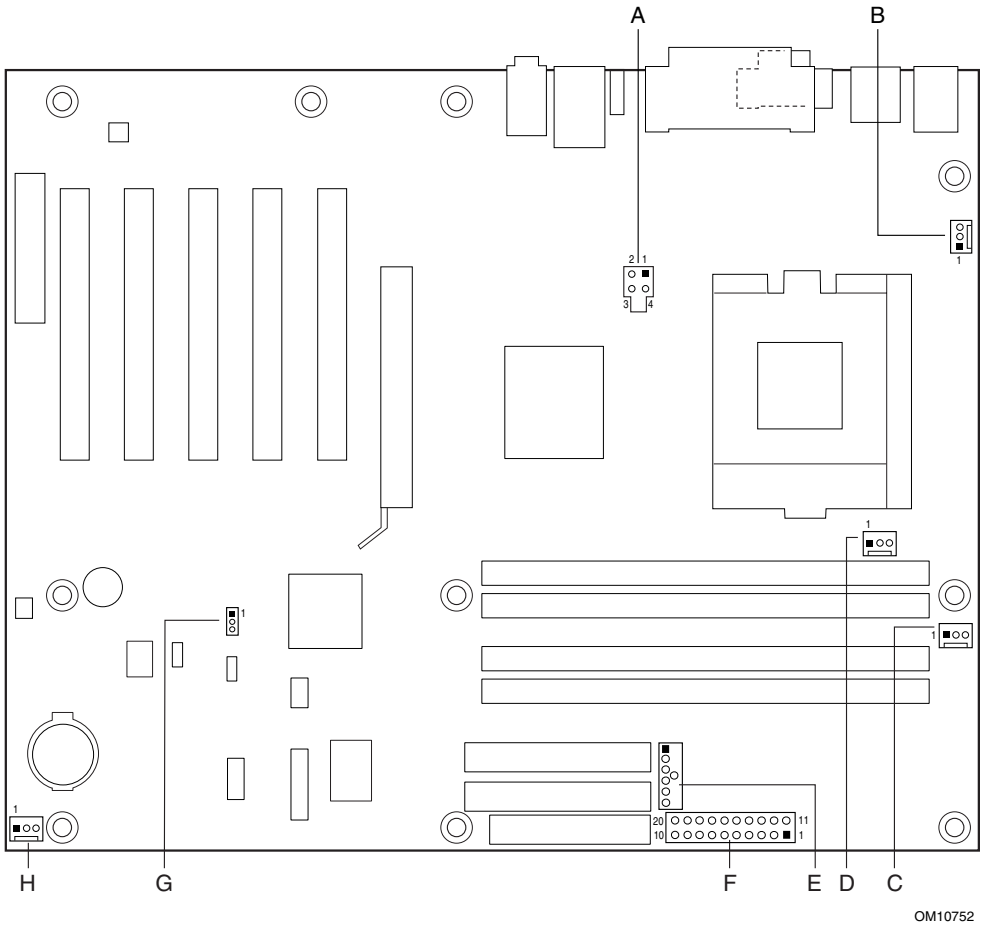


Item	Description	Color
A	Auxiliary line in, ATAPI style	White
B	ATAPI CD-ROM	Black
C	CD-ROM, legacy style, 2 mm	White

Figure 23. Audio Connectors

Power and Hardware Connectors

Figure 24 shows the power and hardware connectors.

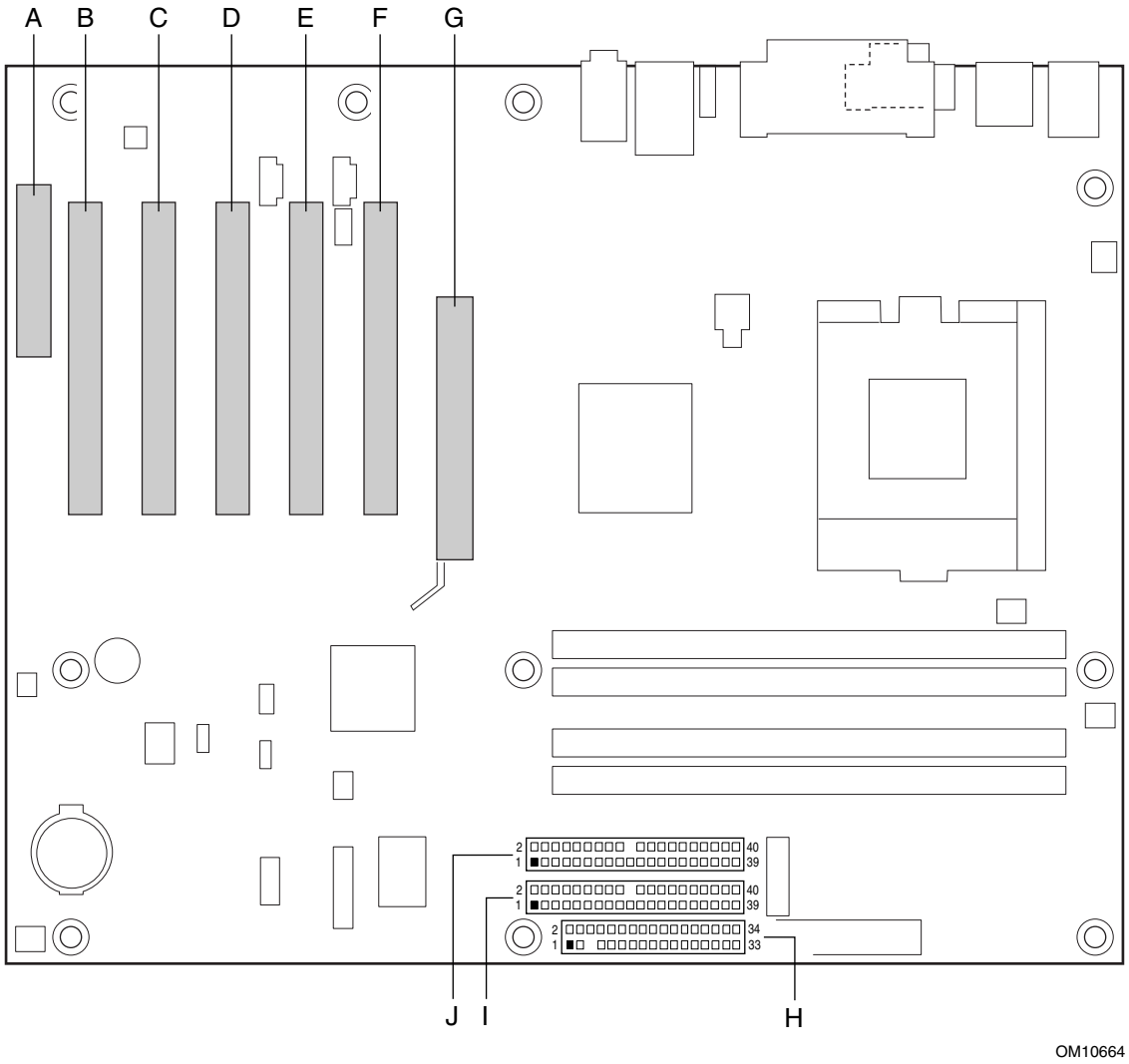


Item	Description	Item	Description
A	ATX 12 V power connector	E	Auxiliary power
B	Processor voltage regulator fan	F	Main power
C	RIMM fan	G	Wake on LAN technology
D	Processor fan	H	Chassis fan

Figure 24. Power and Hardware Control Connectors

Add-In Board and Peripheral Interface Connectors

Figure 25 shows the add-in board and peripheral interface connectors.

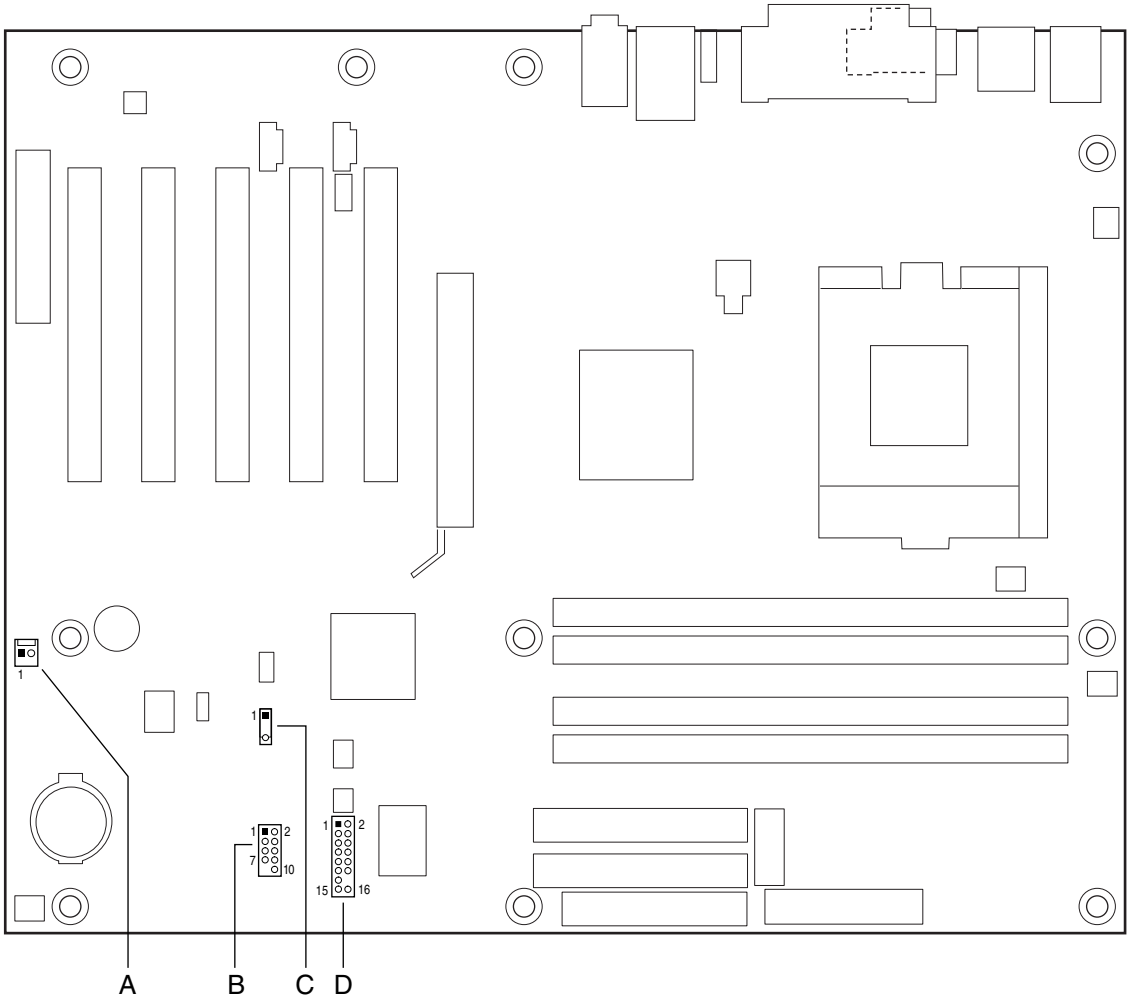


Item	Description	Item	Description
A	CNR (D850GB only)	F	PCI slot 1
B	PCI slot 5	G	AGP slot
C	PCI slot 4	H	Diskette drive
D	PCI slot 3	I	Secondary IDE
E	PCI slot 2	J	Primary IDE

Figure 25. Add-in Board and Peripheral Interface Connectors

Front Panel Connectors

Figure 26 shows the location of the front panel connectors.



Item	Description
A	SCSI LED
B	Front panel USB
C	Auxiliary front panel power LED
D	Front panel

Figure 26. Front Panel Connectors

Desktop Board Resources

Memory Map

Table 25. System Memory Map

Address Range (decimal)	Address Range (hex)	Size	Description
1024 K - 524288 K	100000 - 1FFFFFFF	511 MB	Extended Memory
960 K - 1024 K	F0000 - FFFFF	64 KB	Runtime BIOS
896 K - 960 K	E0000 - EFFFF	64 KB	Reserved
800 K - 896 K	C8000 - DFFFF	96 KB	Available high DOS memory (open to the PCI bus)
640 K - 800 K	A0000 - C7FFF	160 KB	Video memory and BIOS
639 K - 640 K	9FC00 - 9FFFF	1 KB	Extended BIOS data (movable by memory manager software)
512 K - 639 K	80000 - 9FBFF	127 KB	Extended conventional memory
0 K - 512 K	00000 - 7FFFF	512 KB	Conventional memory

DMA Channels

Table 26. DMA Channels

DMA Channel Number	Data Width	System Resource
0	8 or 16 bits	Audio
1	8 or 16 bits	Audio/parallel port
2	8 or 16 bits	Diskette drive
3	8 or 16 bits	Parallel port (for ECP or EPP)/audio
4	8 or 16 bits	DMA controller
5	16 bits	Open
6	16 bits	Open
7	16 bits	Open

I/O Map

Table 27. I/O Map

Address (hex)	Size	Description
0000 - 000F	16 bytes	DMA controller
0020 - 0021	2 bytes	Programmable Interrupt Control (PIC)
0040 - 0043	4 bytes	System timer
0060	1 byte	Keyboard controller byte—reset IRQ
0061	1 byte	System speaker
0064	1 byte	Keyboard controller, CMD/STAT byte
0070 - 0071	2 bytes	System CMOS/Real-time clock
0072 - 0073	2 bytes	CMOS bank 1
0080 - 0090		DMA controller
0094 - 009F		DMA controller
00A0 - 00A1	2 bytes	PIC
00B2 - 00B3	2 bytes	APM control
00C0 - 00DE	31 bytes	DMA
00F0 - 00FF		Numeric data processor
0170 - 0177	8 bytes	Secondary IDE channel
01F0 - 01F7	8 bytes	Primary IDE channel
One of these ranges: 0200 - 0207 0208 - 020F 0210 - 0217 0218 - 021F	Can vary from 1 byte to 8 bytes	Audio/game port
0220 - 022F	16 bytes	Audio (Sound Blaster Pro† -compatible)
0240 - 024F	16 bytes	Audio (Sound Blaster Pro-compatible)
0240 - 024F	16 bytes	Audio (Sound Blaster-compatible)
0278 - 027F*	8 bytes	LPT2
0228 - 022F*	8 bytes	LPT3
02E8 - 02EF*	8 bytes	COM4/Video (8514A)
02F8 - 02FF*	8 bytes	COM2
One of these ranges: 0320 - 0327 0330 - 0337 0340 - 0347 0350 - 0357	8 bytes	MPU-401 (MIDI)
0376	1 byte	Secondary IDE channel command port

continued

Table 27. I/O Map (continued)

Address (hex)	Size	Description
0377, bits 6:0	7 bits	Secondary IDE channel status port
0378 - 037F	8 bytes	LPT 1
0388 - 038B	6 bytes	AdLib† (FM synthesizer)
03CC	1 byte	Video (VGA)
03CE - 03CF	2 bytes	Video (VGA)
03D4 - 03D5	2 bytes	Video (VGA)
03DA	1 byte	Video (VGA)
03E8 - 03EF	8 bytes	COM3
03F0 - 03F5	6 bytes	Diskette channel 1
03F6	1 byte	Primary IDE channel command port
03F8 - 03FF	8 bytes	COM1
One of these ranges: 0530 - 0537 0E80 - 0E87 0F40 - 0F47	8 bytes	Windows Sound System
0800 - 087F		Desktop board resources
LPTn + 400h	8 bytes	ECP port, LPTn base address + 400h
0CF8 - 0CFB*	4 bytes	PCI configuration address register
0CF9**	1 byte	Turbo and reset control register
0CFC - 0CFF	4 bytes	PCI configuration data register
EF00 - EF3F	64 bytes	Windows Sound System
FFA0 - FFA7	8 bytes	Primary bus master IDE registers
FFA8 - FFAF	8 bytes	Secondary bus master IDE registers
Starting on a 64-byte divisible boundary	64 contiguous bytes	Onboard audio controller

* Dword access only

** Byte access only

Interrupts

Table 28. Interrupts

IRQ	System Resource
NMI	I/O channel check
0	Reserved, interval timer
1	Reserved, keyboard buffer full
2	Reserved, cascade interrupt from slave PIC
3	COM2* (user available if COM2 is not present)
4	COM1*
5	LPT2 (Plug and Play option) / audio / user available
6	Diskette drive controller
7	LPT1*
8	Real time clock
9	User available
10	User available
11	User available
12	Onboard mouse port (if present, else user available)
13	Reserved, math coprocessor
14	Primary IDE (if present, else user available)
15	Secondary IDE (if present, else user available)

* Default, but can be changed to another IRQ.

A Error Messages and Indicators

The D850GB/D850GBAL board reports POST errors in three ways:

- By sounding a beep code
- By lighting the enhanced diagnostic LEDs
- By displaying an error message on the monitor

BIOS Beep Codes

The BIOS beep codes are listed in Table 29. The BIOS also issues a beep code (one long tone followed by two short tones) during POST if the video configuration fails (a faulty video card or no card installed) or if an external ROM module does not properly checksum to zero.

Table 29. Beep Codes

Number of Beeps	Description
1	Refresh failure
2	Parity cannot be reset
3	First 64 K memory failure
4	Timer not operational
5	Processor failure (Reserved; not used)
6	8042 GateA20 cannot be toggled (memory failure or not present)
7	Exception interrupt error
8	Display memory R/W error
9	(Reserved; not used)
10	CMOS Shutdown register test error
11	Invalid BIOS (such as, POST module not found)

Enhanced Diagnostic LEDs

Four dual-colored enhanced diagnostic LEDs are located on the back panel (see Figure 27). If the BIOS hangs during the POST, the state of the LEDs indicates which BIOS operation was in progress when the BIOS hung. Table 30 lists the valid states of the LEDs.

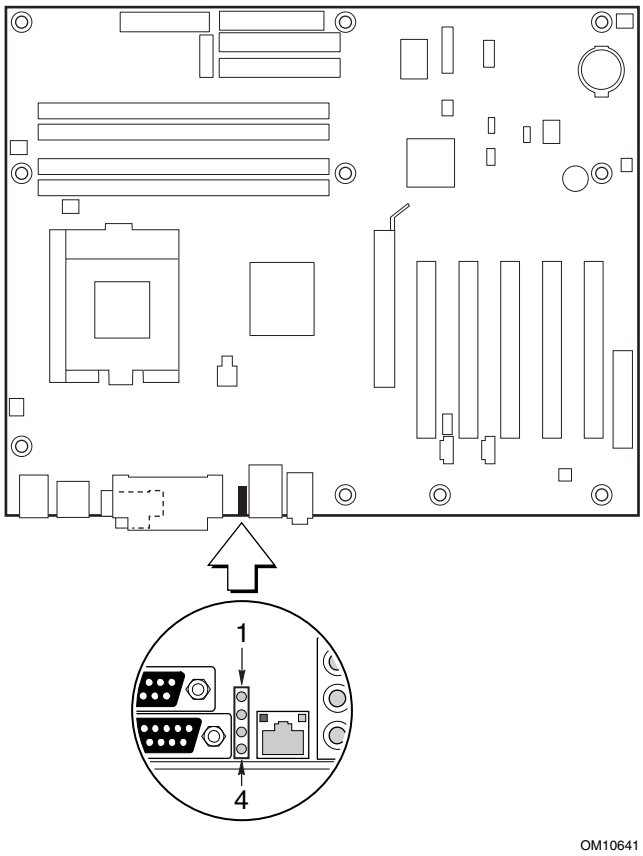
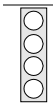
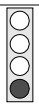
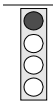
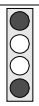
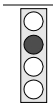
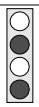
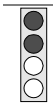
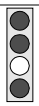
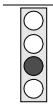
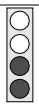
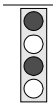
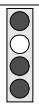
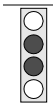
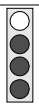
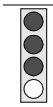
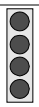


Figure 27. Location of the Enhanced Diagnostic LEDs

Table 30. Enhanced Diagnostic LED States

Display	BIOS Operation	Display	BIOS Operation
 Amber Amber Amber Amber	Power on, starting BIOS	 Amber Amber Amber Green	Reserved
 Green Amber Amber Amber	Recovery mode	 Green Amber Amber Green	Reserved
 Amber Green Amber Amber	Processor, cache, etc.	 Amber Green Amber Green	Reserved
 Green Green Amber Amber	Memory, auto-size, shadow, etc.	 Green Green Amber Green	Reserved
 Amber Amber Green Amber	PCI bus initialization	 Amber Amber Green Green	Reserved
 Green Amber Green Amber	Video	 Green Amber Green Green	Reserved
 Amber Green Green Amber	IDE bus initialization	 Amber Green Green Green	Reserved
 Green Green Green Amber	USB initialization	 Green Green Green Green	Booting operating system

Note: Undefined states are reserved for future use.

BIOS Error Messages

When a recoverable error occurs during the POST, the BIOS displays an error message describing the problem.

Table 31. BIOS Error Messages

Error Message	Explanation
GA20 Error	An error occurred with Gate-A20 when switching to protected mode during the memory test.
Pri Master HDD Error Pri Slave HDD Error Sec Master HDD Error Sec Slave HDD Error	Could not read sector from corresponding drive.
Pri Master Drive - ATAPI Incompatible Pri Slave Drive - ATAPI Incompatible Sec Master Drive - ATAPI Incompatible Sec Slave Drive - ATAPI Incompatible	Corresponding drive is not an ATAPI device. Run Setup to make sure device is selected correctly.
A: Drive Error B: Drive Error	No response from diskette drive.
CMOS Battery Low	The battery may be losing power. Replace the battery soon.
CMOS Display Type Wrong	The display type is different than what has been stored in CMOS. Check Setup to make sure type is correct.
CMOS Checksum Bad	The CMOS checksum is incorrect. CMOS memory may have been corrupted. Run Setup to reset values.
CMOS Settings Wrong	CMOS values are not the same as the last boot. These values have either been corrupted or the battery has failed.
CMOS Date/Time Not Set	The time and/or date values stored in CMOS are invalid. Run Setup to set correct values.
DMA Error	Error during read/write test of DMA controller.
FDC Failure	Error occurred trying to access diskette drive controller.
HDC Failure	Error occurred trying to access hard disk controller.
Checking NVRAM.....	NVRAM is being checked to see if it is valid.
Update OK!	NVRAM was invalid and has been updated.
Updated Failed	NVRAM was invalid but was unable to be updated.
Keyboard Is Locked	The system keyboard lock is engaged. The system must be unlocked to continue to boot.
Keyboard Error	Error in the keyboard connection. Make sure keyboard is connected properly.
KB/Interface Error	Keyboard interface test failed.

continued

Table 31. BIOS Error Messages (continued)

Error Message	Explanation
Memory Size Decreased	Memory size has decreased since the last boot. If no memory was removed, then memory may be bad.
Memory Size Increased	Memory size has increased since the last boot. If no memory was added, there may be a problem with the system.
Memory Size Changed	Memory size has changed since the last boot. If no memory was added or removed, then memory may be bad.
No Boot Device Available	System did not find a device to boot.
Off Board Parity Error	A parity error occurred on an offboard card. This error is followed by an address.
On Board Parity Error	A parity error occurred in onboard memory. This error is followed by an address.
Parity Error	A parity error occurred in onboard memory at an unknown address.
NVRAM / CMOS / PASSWORD cleared by Jumper	NVRAM, CMOS, and passwords have been cleared. The system should be powered down and the jumper removed.
<CTRL_N> Pressed	CMOS is ignored and NVRAM is cleared. User must enter Setup.

B Regulatory and Integration Information

This appendix contains:

- Safety standards, electromagnetic compatibility regulations, and product certification markings for this desktop board
- Instructions and precautions for integrators who are installing this board in a chassis

Regulatory Compliance

This board complies with the following safety and EMC regulations when correctly installed in a compatible chassis.

Table 32. Safety Regulations

Regulation	Title
UL 1950/CSA950, 3rd edition, Dated 07-28-95	Bi-National Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (USA and Canada)
EN 60950, 2nd Edition, 1992 (with Amendments 1, 2, 3, and 4)	The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (European Community)
IEC 950, 2nd edition, 1991 (with Amendments 1, 2, 3, and 4)	The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (International)
EMKO-TSE (74-SEC) 207/94	Summary of Nordic deviations to EN 60950. (Norway, Sweden, Denmark, and Finland)

Table 33. EMC Regulations

Regulation	Title
FCC Class B	Title 47 of the Code of Federal Regulations, Parts 2 and 15, Subpart B, pertaining to unintentional radiators. (USA)
CISPR 22, 2nd Edition, 1993 (Class B)	Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (International)
VCCI Class B (ITE)	Implementation Regulations for Voluntary Control of Radio Interference by Data Processing Equipment and Electronic Office Machines. (Japan)
EN55022 (1994) (Class B)	Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (Europe)
EN50082-1 (1992)	Generic Immunity Standard; Currently compliance is determined via testing to IEC 801-2, -3, and -4. (Europe)
ICES-003 (1997)	Interference-Causing Equipment Standard, Digital Apparatus, Class B (Including CRC c.1374) (Canada)
AS/NZ 3548	Australian Communications Authority (ACA), Standard for Electromagnetic Compatibility.

Product Certification Markings

This printed circuit assembly has the following product certification markings:

- UL Joint Recognition mark: Consists of small c followed by a stylized backward UR and followed by a small US (component side)
- Manufacturer's recognition mark: Consists of a unique UL recognized manufacturer's logo, along with a flammability rating (94V-0) (solder side)
- UL file number for desktop boards: E139761 (component side)
- PB part number:
  - Intel bare circuit board part number for D850GB (solder side) A22917-XXX
  - Intel bare circuit board part number for D850GBAL (solder side) A23794-XXX
- Battery "+ Side Up" marking: Located on the component side of the board in close proximity to the battery holder
- FCC logo/declaration: Located on the solder side
- ACA (C-Tick) mark: Consists of a unique letter C, with a tick mark; followed by N-232. Located on the component side of the board and on the shipping container.
- CE mark: Located on the component side and on the shipping container

Installation Precautions

When you install and test the board, observe all warnings and cautions in the installation instructions.

To avoid injury, be careful of:

- Sharp pins on connectors
- Sharp pins on printed circuit assemblies
- Rough edges and sharp corners on the chassis
- Hot components (like processors, voltage regulators, and heat sinks)
- Damage to wires that could cause a short circuit

Observe all warnings and cautions that instruct you to refer computer servicing to qualified technical personnel.

WARNING

Do not open the power supply. Risk of electric shock and burns from high voltage and rapid overheating. Refer servicing of the power supply to qualified technical personnel.

Installation Instructions

⚠ CAUTION

Follow these guidelines to meet safety and regulatory requirements when installing this board assembly.

Read and adhere to all of these instructions and the instructions supplied with the chassis and associated modules. If the instructions for the chassis are inconsistent with these instructions or the instructions for associated modules, contact the supplier's technical support to find out how you can ensure that your computer meets safety and regulatory requirements. If you do not follow these instructions and the instructions provided by chassis and module suppliers, you increase safety risk and the possibility of noncompliance with regional laws and regulations.

Ensure Electromagnetic Compatibility (EMC)

Before computer integration, make sure that the power supply and other modules have passed EMC testing using a board with a processor from the same family and operating at the same (or higher) speed as the processor on this desktop board.

In the installation instructions for the host chassis, power supply, and other modules pay close attention to the following:

- Certifications
- External I/O cable shielding and filtering
- Mounting, grounding, and bonding requirements
- Keying connectors when mating the wrong connectors could be hazardous

If the power supply and other modules have not passed applicable EMC testing before integration, EMC testing must be conducted on a representative sample of the newly completed computer.

Ensure Chassis and Accessory Module Certifications

Make sure that the chassis, any added subassembly, such as a board or drive assembly, and internal or external wiring, are certified for the region(s) where the end-product will be used. Marks on the product are proof of certification. Certification marks are as follows:

In Europe

The CE marking signifies compliance with all relevant European requirements. If the chassis does not bear the CE marking, obtain a supplier's Declaration of Conformity to the appropriate standards required by the European EMC Directive and Low Voltage Directive. Other directives, such as the Machinery and Telecommunications Directives, might also apply depending on the type of product. No regulatory assessment is necessary for low voltage DC wiring used internally or wiring used externally when provided with appropriate overcurrent protection. Appropriate protection is provided by a maximum 8-A current limiting circuit or a maximum 5-A fuse or positive temperature coefficient (PTC) resistor. All Intel desktop boards now have PTCs on all external ports that provide DC power externally.

In the United States

A certification mark by a Nationally Recognized Testing Laboratory (NRTL) such as UL, CSA, or ETL signifies compliance with safety requirements. External wiring must be UL Listed and suitable for the intended use. Internal wiring must be UL Listed or Recognized and rated for applicable voltages and temperatures. The FCC mark (Class A for commercial or industrial only or Class B for residential) signifies compliance with electromagnetic interference requirements.

In Canada

A nationally recognized certification mark such as CSA or cUL signifies compliance with safety requirements. No regulatory assessment is necessary for low voltage DC wiring used internally or wiring used externally when provided with appropriate overcurrent protection. Appropriate protection is provided by a maximum 8-A current limiting circuit or a maximum 5-A fuse or positive temperature coefficient (PTC) resistor. All Intel desktop boards now have PTCs on all external ports that provide DC power externally.

Prevent Power Supply Overload

Unless the power supply has inherent overcurrent protection, do not overload the power supply output. To avoid overloading the power supply, make sure that the calculated total current load of all the modules within the computer is less than the output current rating of the power supply. If you do not do this, the power supply could overheat, catch fire, or damage the insulation that separates hazardous AC line circuitry from low-voltage user accessible circuitry. If the load drawn by a module cannot be determined by the markings and instructions supplied with the module, contact the module supplier's technical support.

Place Battery Marking on the Computer

There is insufficient space on this board to provide instructions for replacing and disposing of the battery. The following warning must be placed permanently and legibly on the chassis as near as possible to the battery.

⚠ WARNINGS

Danger of explosion if battery is incorrectly replaced.

Replace with only the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Use Only for Intended Applications

This board was evaluated for use in computers that will be installed in offices, homes, schools, computer rooms, and similar locations. The suitability of this product for other applications, (such as medical, industrial, alarm systems, and test equipment) might require further evaluation.